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VEHICLE MOBILITY ASSESSMENT FOR PROJECT WHEELS STUDY GROUP

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13. ABSTRACT
Project WHEELS is a study to evaluate the performance of individual standard military trucks both off and on road in relation to their missions and to cash savings possible through the elimination of special military automotive features, such as front-wheel drive, or the use of commercial vehicles in some missions. Such evaluations can only be based upon the most reliable assessments of mobility performance possible. The AMC-71 Ground Mobility Model was used to assess the off- and on-road speed performance of a group of military and commercial vehicles and vehicles with trailers or howitzers, totaling 48 cases of direct interest and 6 reference vehicles, ranging from 1-ton gross vehicle weight to 90-ton gross combined weight. The terrain data used in predicting off-road performance were obtained from transects, or strips of ground, about 3 by 52 km located in West Germany, Thailand, and Arizona, each representative of different types of climatic zones and terrain conditions. The road data used in predicting on-road performance were collected from segments of primary, secondary, and trail-type roads; each segment was approximately 100 miles long. Both off- and on-road performance was predicted in terms of speed for all vehicles and vehicle-trailer or -howitzer combinations included in the study. Off-road speed was predicted for traverses made up of five straight lines equally spaced along the length of the transects. On-road speed was predicted for the total length sampled in each road category. Several off-road terrain traverse speed predictions were made. These included speed made over a combination of areal (patches of homogeneous terrain) and linear (streams and rivers) terrains identified as V_{110}, speed over areal terrain (V_{100}), and speed over areal terrain with the worst 10 percent removed from consideration (V_{90}). On-road speed predictions were made for trails (V_3), secondary roads

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(V_2), and primary roads (V_1). Performance in terms of percentage of off- and on-road areal terrains in the traverses and trails, respectively, that the vehicles could not traverse is also indicated. Rankings of the performance of the vehicles considered were made on the basis of the V_{90} and V_3 speeds for each transect or road network.

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Errata Sheet

VEHICLE MOBILITY ASSESSMENT FOR PROJECT WHEELS STUDY GROUP

1. Table 9, Item No. 42 - Under column 6, "Horsepower per Ton (hpt)," change "8.2" to read "13"
2. Table 9, Item No. 44 - Under column 3, "Trailer-Howitzer," change to read: "M127A1C, 4-wheel, 12-ton semitrailer"
3. Table 10, Item No. 44 - Under column 3, "Trailer-Howitzer," change to read: "M127A1C, 4-wheel, 12-ton semitrailer"
4. Table 11, "Item No. 44 - Under column 3, "Trailer-Howitzer," change to read: "M127A1C, 4-wheel, 12-ton semitrailer"
5. Table C1, Characteristic No. 4 - Under "Identification" delete last three words, "tire ply rating"
6. Table C1, Characteristic No. 4, Vehicle Nos. 41, 42, 43, 44, 45, and 46. Change to read "18"
7. Table C1, Characteristic No. 9, Vehicle Nos. 41, 42, 43, 44, 45, and 46. Change to read "18"
8. Table C1, Characteristic No. 44, Vehicle No. 42. Change to read "13"

1c

VEHICLE MOBILITY ASSESSMENT
FOR
PROJECT WHEELS STUDY GROUP
(With Addenda)

September 1972

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FOREWORD

The study reported herein was performed by the U. S. Army Tank-Automotive Command (TACOM) and the U. S. Army Engineer Waterways Experiment Station (WES) for the Department of the Army WHEELS Study Group. The study was authorized by the Directorate of Research, Development and Engineering, U. S. Army Materiel Command (AMC), by first indorsement dated 25 April 1972 to basic letter from the Director, WHEELS Study Group, dated 12 April 1972, subject: "Vehicle Mobility Assessment for WHEELS Study Group," and was extended by letter to CG, AMC, from the Director, WHEELS Study Group, dated 30 June 1972, subject: "Phase II Additional Requirements for Vehicle Mobility Assessment for WHEELS Study Group." The requests called for an assessment of mobility of vehicles already in the fleet and candidates for their replacement. The results of this study were used by the WHEELS Study Group in performing its analysis of the Army's wheeled vehicle program.

Acknowledgments are made to BG J. G. Waggener, and BG F. J. Baer, successive Directors, WHEELS Study Group, for providing the opportunity to apply the AMC-71 Ground Mobility Model to such an important study; to Project WHEELS staff members who monitored the study and provided helpful suggestions; and to Mr. D. Woomert of Ar Materiel Systems Analysis Agency, who participated as a member of the mobility research team.

Acknowledgments are also made to TACOM and WES personnel who participated in the study for their untiring efforts to ensure the expeditious completion of the study.

The main study was performed during April and May 1972, with added tasks through August 1972, under the supervision of Messrs. H. Otto, TACOM, and W. G. Shockley and S. J. Knight, WES. The material for this report was assembled and analyzed by the following personnel:

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COL Ernest D. Peixotto, CE, was Director of the WES during the conduct of this study and the preparation of the report, and Mr. F. R. Brown was Technical Director.

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LIST OF TABLES IN MAIN TEXT

CONVERSION FACTORS, BRITISH TO METRIC AND METRIC TO BRITISH UNITS OF MEASUREMENT

British units of measurement used in this report can be converted to metric units as follows:

Multiply	By	To Obtain
(1) inches	2.54	centimeters
(2) square inches	6.4516	square centimeters
(3) feet	0.3048	meters
(4) miles (U. S. statute)	1.6093	kilometers
(5) square miles	2.5899	square kilometers (100 hectares)
(6) pounds	0.4536	kilograms
(7) pounds per square inch	0.0703	kilograms per square centimeter
(8) tons (2000 lb)	907.19	kilograms

Metric units of measurement used in this report can be converted to British units as follows:

Multiply	By	To Obtain
(1) kilometers	0.6214	miles
(2) meters	3.2808	feet
(3) centimeters	0.3937	inches

SUMMARY

Project WHEELS is a study to evaluate the performance of individual standard military trucks both off and on road in relation to their missions and to cash savings possible through the elimination of special military automotive features, such as front-wheel drive, or the use of commercial vehicles in some missions. Such evaluations can only be based upon the most reliable assessments of mobility performance possible.

The AMC-71 Ground Mobility Model was used to assess the off- and on-road speed performance of a group of military and commercial vehicles and vehicles with trailers or howitzers, totaling 48 cases of direct interest and 6 reference vehicles, ranging from 1-ton gross vehicle weight to 90-ton gross combined weight. The terrain data used in predicting off-road performance were obtained from transects, or strips of ground, about 3 by 52 km located in West Germany, Thailand, and Arizona, each representative of different types of climatic zones and terrain conditions. The road data used in predicting on-road performance were collected from segments of primary, secondary, and trail-type roads; each segment was approximately 100 miles long.

Both off- and on-road performance was predicted in terms of speed for all vehicles and vehicle-trailer or -howitzer combinations included in the study. Off-road speed was predicted for traverses made up of five straight lines equally spaced along the length of the transects. On-road speed was predicted for the total length sampled in each road category.

Several off-road terrain traverse speed predictions were made. These included speed made over a combination of areal (patches of homogeneous terrain) and linear (streams and rivers) terrains identified as V_{110}, speed over areal terrain (V_{100}), and speed over areal terrain with the worst 10 percent removed from consideration (V_{90}). On-road speed predictions were made for trails (V_3), secondary roads (V_2), and primary roads (V_1). Performance in terms of percentage of off- and on-road areal terrains in the traverses and trails, respectively, that the vehicles could not traverse is also indicated. Rankings of the performance of the vehicles considered were made on the basis of the V_{90} and V_3 speeds for each transect or road network.

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Examination of the main study results showed that predicted average speeds were in many areas sharply affected by vehicle ride dynamics. As a result, ride-speed tests were made on a number of vehicles in the study and some predictions adjusted accordingly (Addendum I). Three additional vehicles were also evaluated subsequent to the main study (Addendum II).

VEHICLE MOBILITY ASSESSMENT FOR PROJECT WHEELS STUDY GROUP

1. INTRODUCTION

This study was performed by the U. S. Army Tank-Automotive Command (TACOM) and the U. S. Army Engineer Waterways Experiment Station (WES) for the Department of the Army WHEELS Study Group (WSG), which is responsible for an analysis of the Army's wheeled vehicle program.

1.1 Objective

The objective of this study was to assess the off- and on-road performances of a group of standard and modified military wheeled vehicles and commercial wheeled vehicles with and without trailers. The group represents a wide range in mobility and payload capabilities.

1.2 Background

Project WHEELS is a staff study to critically examine the Army's wheeled vehicle fleet. An important aspect of the examination is an evaluation of the off- and on-road performances of individual standard trucks in relation to their missions and to cost savings effected through elimination of special military automotive features, such as front-wheel drive, or through use of commercial vehicles in certain missions. Such an evaluation can be based only upon the most reliable assessments of mobility performance.

During the planning phase of Project WHEELS, WSG personnel asked TACOM and WES, the agencies principally responsible for the U. S. Army Materiel Command (AMC) ground mobility research program, to suggest the most reliable methods within the project time constraints of assessing the off- and on-road mobility of a large number of vehicles.

1.3 Approach

A critical review of current applicable off-road mobility technology revealed that study needs would be best met by using the AMC-71 Ground Mobility Model (AMC-71) to obtain off- and on-road speed performances for each vehicle configuration in one or more representative terrains. Terrain data available at WES for several strips of terrain or transects (each approximately 3x50 km) located in West Germany, Thailand, and Arizona (see Appendixes A and B) were used in the study. Necessary vehicle data (Appendix C) were obtained from TACOM, Aberdeen Proving Ground, WES, the Study Group, and vehicle manufacturers.

Although AMC-71 was developed from many years of prior mobility research, it is a first-generation model. Accordingly, some judgment was recognized as necessary for obtaining the reliable on-time information needed.

2. AMC-71 GROUND MOBILITY MODEL

2.1 Purpose

The AMC-71 Ground Mobility Model is designed to predict the quantitative mobility performance of vehicles operating in quantitatively described terrains. The model does not consider directly any characteristics other than those that affect mobility, e.g. reliability, maintainability, fire power, etc.

2.2 History

TACOM, WES, and the U. S. Army Engineer Cold Regions Research and Engineering Laboratory (CRREL) are responsible for conducting ground mobility research for AMC. In FY 71, a unified AMC ground mobility research program was implemented with the capabilities of all three laboratories geared to achieve common goals.

At that time, a review of military user requirements for vehicle mobility information revealed a common need for a uniform, reliable, objective analytical procedure for estimating the performance of a vehicle in any specific operational environment.[1] To meet this need, the technology of off-road vehicle performance, developed over the preceding 25 years of Army-sponsored research, was integrated into a first-generation model during FY 71-72. The model, called the AMC-71 Ground Mobility Model, was formed by coupling the significant vehicle-terrain-driver interactions that affect off-road vehicle performance.* This model is a digital computer program with some analog computer submodels for evaluating vehicle dynamics. The analog outputs are interfaced manually with the main digital program. AMC-71 is available on computers at TACOM and WES.

* A draft report on AMC-71, including programming instructions, is being prepared for publication.

The current compatible terrain data files consist of small-scale areal terrain unit maps of one transect each in Puerto Rico, West Germany, Thailand, and Arizona. Each transect is about 3 km by 50 km. In the near future, a similar map will be completed for a transect in Alaska. Maps of linear terrain units (i.e. streams) at the same scale as the areal terrain unit maps for the same transects are also being compiled, but are not yet complete. Data for approximately 30 self-propelled wheeled and tracked vehicles are now stored in the computer files for easy use.

In its present configuration, AMC-71 has been and is being used in studies to evaluate:

a. Craters as barriers to vehicle movement

b. The performance of self-propelled howitzers and prime mover-howitzer combinations for selected world terrains

c. Concepts for a Main Battle Tank

d. Performance of the XR311 and the military jeep for several selected terrains

e. Performance of 1/2- to 3/4-ton vehicle test bed over a variety of terrain conditions

Its use in Project WHEELS is the most extensive practical application to date.

2.3 Basic Premises

The performance of a vehicle at any moment is the result of a complex interplay among many different characteristics of the vehicle, numerous features of the particular terrain in which it is operating, its immediate past operating history, and elections and constraints imposed by the driver. AMC-71 postulates that the maximum practical speed of a sound vehicle at any moment, including zero (or No Go) is the proper measure of its mobility at that time and place. Accordingly, each of the many system parameters potentially involved must be quantified in engineering terms that will permit calculation of probable vehicle speed as limited by one or more of a number of possible specific terrain-vehicle-driver interactions. Table 1 outlines system attributes

considered in AMC-71 at this time.

The endless variability of real terrain can be represented by a mosaic of pieces, each of which, to some feasible resolution, can be considered uniform (deterministically or probabilistically) in terms of measurable factors affecting vehicle responses. Such a subclass of terrain is called a terrain unit. An areal terrain unit is currently characterized by 13 measurements (in class intervals) reflecting the type and strength of surface materials, slope, prevailing ground roughness, discrete obstacles, and vegetation (table 2, column a); a linear terrain unit by 9 measurements covering type and strength of surface materials, cross section, and water depth and velocity (table 3, column b); and a road unit by 5 measurements expressing surface type, strength, slope, curvature, and roughness (table 2 column c).

Maximum practical speeds for a vehicle in each areal, linear terrain, and road unit within an area, calculated from validated engineering relations, can be combined by suitable procedures to predict the performance of the vehicle along any given path in the real terrain, and/or to accumulate a statistical representation of vehicle performance in the area as a whole.

2.4 Structure

The basic structure of AMC-71 is illustrated in fig. 1. Pertinent vehicle characteristics (table 3) and complete data on all terrain units in an area are stored in computer files and accessed as needed by a central performance module. The performance module accepts descriptors for a single terrain unit and, after examination of a range of possibilities, outputs to a temporary file the maximum possible vehicle speed in the terrain unit and an identification of the controlling relations. The entire terrain file for an area is iteratively examined, one unit at a time, until performance in each unit has been determined and stored. At that point, answers in the temporary file are organized, suitably combined, analyzed, printed, refiled, etc., by an output routine designed to meet the needs of the particular study.

The basic output of AMC-71 is vehicle speed in each of a series of areal terrain, linear terrain, and/or road units. The further processing of these speeds can develop performance predictions along specified paths, determine optimum paths between selected points under various constraints, and/or generate statistics concerning the vehicle's performance in the terrain as a whole.

The central performance module, the heart of AMC-71, has three parallel forms: one to handle areal terrain, a second to examine linear terrain (rivers, streams, ditches, roads, etc.) offering identifiable linear barriers to vehicle crossing, and a third to predict performance on a network of roads. A given study may involve use of one, two, or all three performance modules. The areal and linear modules together are identified as the off-road model, and the road module is identified as the on-road model.

A more detailed structure of the areal terrain performance module is shown in fig. 2. Terrain and data files are accessed by each submodel as needed. In the areal terrain performance module, each terrain unit description is combined with the vehicle characterization to calculate a number of possible operating speeds as limited by power and power train characteristics; available traction; motion resistances engendered by soils, slopes, and overriding of obstacles and vegetation; local maneuvering to avoid vegetation and obstacles; ride and obstacle-crossing dynamics; visibility restrictions; and acceleration and braking performance. The logic of the model examines the least of these several speeds as influenced by obstacles and vegetation and performs a speed analysis to decide how much to override and how much to avoid. From this it determines the maximum feasible vehicle speed within the described terrain unit. The module repeats the procedure three times for each terrain unit (where required), once with the vehicle running straight upslope, once running directly downslope, and once running along the slope contour. The average of these three speeds is assigned to the terrain unit as whole; when upslope operation is No Go, the other two are also taken to be No Go. The areal terrain performance

module is constructed with a submodel to assess a time penalty for No Go situations rather than to accept a zero speed with its implications of eternal rest. At present, this submodel has not been detailed, so a uniform in-unit speed of 0.1 mph was substituted for all No Go's.

The composition of the linear terrain performance module is diagramed in fig. 3. The module is structured to account for fording (where possible), swimming (where possible), rafting or bridging (where necessary), ingress, and egress. Like the areal terrain performance module, the linear terrain performance module determines speeds (in terms of crossing times) and No Go's and assesses time penalties for No Go's, in recognition of the fact that the Army will arrange the necessary engineer support in advance if it must get through.

The basic workings of the on-road performance model are displayed in fig. 4. In its present form this model is essentially an off-road areal terrain performance module with no vegetation or obstacles, but with an added relation for limiting speed due to road curvature.

The areal, linear, and road speeds for a vehicle in a terrain (or road) unit are predicted for discrete patches of terrain. The principal means of interpreting these for an area is to examine the performance along specific or generalized routes, or traverses, through the area. Traverse predictions are made by adding traverse times across areal and linear terrain units.

2.5 Current Status

Although AMC-71 is a first-generation model, it is considered a major advance over previously available ad hoc simulations of off-road vehicle performance, in completeness and realism (principally in accepting a full array of real terrain data), relative degree of validation, and overall reliability. During its formulation, however, some gaps and weaknesses in the prior, less coordinated research were revealed; several problems of interfacing laboratory idealizations with field realities required judicious resolution; and many important areas

for future validation, refinement, and useful extension became evident. Accordingly, AMC-71 is still very much work-in-progress.

Major simplifications upon which an AMC-71 performance model is currently based are:

a. Terrain is made deterministic (in the present instance, by using the mid-range values for each class of each descriptor).

b. The driver acts only as a governor who imposes speed limits based upon fixed absorbed power (ride) or acceleration (obstacle crossing) limits occurring at his seat location, or upon forward visibility.

c. Dynamics, traction, and obstacle negotiation are treated as two-dimensional only, with no yaw or roll motions considered (except for possible side-slope overturning); i.e. vertical vehicle motions only are computed, all obstacles are approached head-on, etc.

d. Ground roughness and obstacles are treated as unyielding, and no tire or suspension compliance is considered in examining for obstacle interferences.

e. Performance is predicted for a single vehicle operating on a one-pass basis.

f. Possible surface slipperiness or pronounced soil layering is not accounted for.

g. No provision is made for transition speeds from one terrian unit to another, or for approaching or leaving a major linear terrain feature.

h. All tire traction performance is calculated on the basis of standard, military, nondirectional, medium-skid, cross-country tires.

AMC-71 can predict speed performance for wheeled and tracked combat and support vehicles. Modeling of pitch-articulated vehicles is incomplete, and dynamic modeling has not yet been generalized to handle pitch articulation or bogie suspensions without special programming.

Careful validation of the AMC-71 off-road model and submodels through field testing was begun in 1971 and is a continuing long-range project. Validation testing to date has been conducted at Fort Sill,

Oklahoma, and Yuma Proving Ground, Arizona, with four conventionally configured vehicles--two wheeled (M151A2 1/4-ton, 4x4 utility truck, and M35A2 2-1/2-ton, 6x6 cargo truck) and two tracked (M113 armored personnel carrier and M60A1 tank). The Fort Sill tests[2], in which all the vehicles maintained traverse speeds ranging from 10 to 30 mph, showed that predicted speeds were within ±4 mph of measured speeds in all cases. Variations were identified as caused in large part by driver responses, affected by visibility, experience, and risk evaluation; to transition speeds between terrain units; and to dynamic power losses to suspension systems. None of these effects are yet accounted for in the model. In spite of these and other known limitations, the model is considered useful in current and near-future simulations, provided only that its limitations are not completely overlooked in the interpretation and application of final results.

3. ADAPTATION OF AMC-71 MODEL FOR WHEELS STUDY

The objective of the WSG as related to the use of AMC-71 were to:

a. Quantify off-road mobility

b. Quantify on-road mobility.

c. Assess performance changes due to denial of front-wheel drive.

d. Assess performance changes due to use of locking and limited-slip differentials.

e. Assess performance changes due to denial of special shallow-water fording features, such as waterproof ignition.

f. Demonstrate the effects of multiple vehicle operation on off-road mobility performance.

Objectives a and b were to be pursued for each military and commercial vehicle and vehicle-trailer combination in a group of 48 of direct interest and 6 reference vehicles (table 9).* Weights ranged from 1-ton gross weight for individual vehicles to 90-ton gross weight for vehicle combinations. Objectives c through f were to be pursued for a number of cases.

For proper contribution to the study, changes or additions to AMC-71 were required to deal with problems or vehicle configurations not yet addressed in the operating model, to utilize dynamics submodels compatible with the large number of vehicles involved and the limited time available for the study, and to formulate output analyses and formats suitable for the study.

To incorporate even approximate means of treating problems involving forces and motions other than those in the center-line plane, i.e. roll and yaw articulation or special differentials was not possible within the study time frame. In addition, the Go-No Go advantages of pitch articulation in negotiating large, single obstacles were not formulated.

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* Three additional vehicles were evaluated subsequently. See Addendum II.

3.1 Special Feature Treatment

3.1.1 On-road performance

The flow chart for the on-road performance model was presented earlier (fig. 4) to emphasize its basic similarity to the areal performance module from which it was derived. The on-r 'i model was, in fact, made operational specifically to meet the requirements of this study. Power train, slope, and ride dynamics submodels from the areal module were used in toto. The soil strength submodel was used for unsurfaced fair-weather roads; whereas constant gross motion resistance coefficients with no allowance for air resistance were used for all other roads. A submodel was added to limit speed as a function of road curvature and road type shown in fig. 5. Note that the on-road model can predict No Go's in especially severe conditions, such as might be encountered in wet seasons on unsurfaced, fair-weather roads and trails.

3.1.2 Front-wheel-drive denial and towed trailers

Formulas used in the soil-vehicle submodel for computing vehicle cone index (VCI), which is the minimum soil strength required to complete a prescribed number (1 or 50) of passes of self-propelled wheeled vehicles operating on fine- and coarse-grained soils, apply only to all-wheel-drive vehicles. Because this study included vehicles with front-wheel drive capability denied and with towed loads, provision was added to compute the minimum 1-pass soil strength requirements (VCI_1) for such vehicle configurations.

A compatible traction submodel was formulated. The order of change that occured in VCI_1 requirements for fine- and coarse-grained soils due to front-wheel drive denial and to towed loads in illustrated in the following tabulation.

M35A2 2-1/2-ton, 6x6 Cargo Truck

Drive Configuration	Trailer	VCI_1 Fine-Grained Soil	VCI_1 Coarse-Grained Soil
6x6	--	27	26
6x4	--	37	36
6x6	M105A2	34	27
6x4	M105A2	40	50

3.1.3 Large tire deflections

Computations of VCI_1 in coarse-grained soils use actual operating tire deflection. However, normal computations of VCI_1 for fine-grained soils use 10-15 percent deflection, which is characteristic of standard military tires at recommended off-road inflation pressures. The M520E1 8-ton, 4x4 cargo truck is equipped with earthmover tires designed to operate at approximately 25 percent deflection. The standard VCI_1 calculation for this vehicle was modified by reference to the results of WES soil bin research in clays, which show a reduction in VCI_1 for fine-grained soils, in this case, of 30 percent.[1]

3.1.4 Reduction in fording capability

Reduction in fording capability was handled by the existing fording submodel of the linear performance module, once a suitably reduced fording depth limit was assigned as a vehicle characteristic.

3.1.5 Effects of traffic on vehicle off-road performance

To examine the order of effects of multiple vehicle operation on the speed predictions, the standard 50-pass soil strength criterion, VCI_{50}[3], was introduced in place of the 1-pass criterion, VCI_1, in the AMC-71 soil submodel. No adjustment was attempted to reduce vegetation resistances as a result of the trail-breaking efforts of the first vehicle or possible degradation of obstacles with traffic.

3.2 Special Dynamics Submodels

In many terrains vehicle speed is limited by vehicle vibrations induced by essentially continuous ground roughness (ride dynamics). In other terrains, average terrain unit speeds are limited by the slow speeds

necessary to reduce shock to a tolerable level while negotiating regularly occurring characteristic obstacles, such as small dikes and ditches. Both limits are essentially dynamic, and severity of response at the driver's seat is assumed to be the criterion.

The modeling of vehicle dynamics differs fundamentally from that of other elements in AMC-71. The mathematical simulation of dynamic response requires the time-consuming solution of differential equations; whereas the other submodels essentially involve rapid solution of algebraic equations. To include dynamics effects on vehicle performance in this study, it was necessary to exclude from consideration the use of an available sophisticated ride dynamics submodel programmed for an analog computer and to select a simpler and more rapid approach having an algebraic structure. The gain in time is paid for by decreased accuracy.

3.2.1 Ride dynamics submodel

The simplified ride dynamics submodel used was based on [illegible]-ride dynamics model used by TACOM in support of the REVAL WHEELS Study (1968). This linear, two-dimensional model permits only two degrees of freedom, single rigid body pitch and bounce. Only vertical motions at the driver's seat are used to compute absorbed power; tire compliances are not considered. However, the basic structure of the submodel is straightforward and allows existing terrain data to be used directly.

The submodel is used by specifying a number of pertinent structural and geometric vehicle parameters. It outputs a graph of driver absorbed power versus vehicle speed, as shown in fig. 6, in which the horizontal line represents the 6-watt comfort limit for a terrain roughness of 1-in. root mean square (RMS) elevation. Intersection of the 6-watt comfort limit line with the absorbed power curve in any terrain roughness defines the limiting vehicle speed for that roughness. Where several intersections can occur, a judgment is made as to which is

appropriate, the most frequent choice being the highest speed intersection. Because the submodel is linear, speed limits for any roughness can be determined from a single absorbed-power curve for one roughness simply by altering the power scale properly. For example, dividing the ordinates of the 1-in. RMS elevation curve by a factor of four is equivalent to inputting a terrain roughness of 1/2-in. RMS elevation; multiplying by four is equivalent to a terrain roughness of 2. Speeds obtained in this manner, plotted against roughness, make up the 6-watt ride limit curves used in the performance module per se. An example is shown in fig. 7.

Initial trials of the original V-ride submodel resulted in unreasonable dynamic responses for many vehicles. A set of modifications was devised that improved its apparent performance. These were as follows:

a. For single-axle suspensions, tire spring and damping rates were considered in series with suspension spring and damping rates. The spring and damping rates of dual tires were computed as parallel combinations of those of the individual tires.

b. Tandem axles on bogied suspensions were regarded as independently suspended on springs of one-quarter the spring rate of the actual bogie spring. This fraction was obtained by considering departures from equilibrium position of the true suspension spring incurred by the incremental elevation of one of the tandem axles at a time, and seemed reasonable in terms of the ride-smoothing effect of the bogied arrangement in most operations.

c. Both cargo trailers and semitrailers were handled by determining the static load transferred to the pintle or fifth wheel, computing an "effective mass" corresponding to this load, and adding this quantity to the inertial mass of the tractor vehicle. The pitch moment of inertia was not altered. Articulated vehicles were treated as tractor-trailer combinations.

Trails of the V-ride submodel with the above modifications resulted in improved dynamics predictions, but discrepancies from

experience were still apparent. To make a final adjustment to the ride predictions, estimates of maximum speeds for the principal individual vehicles in the study, each in moderately rough field terrain (approximate RMS elevation = 1.5 in.), were solicited from two independent expert sources connected with neither TACOM nor WES. The degree of concensus is illustrated in fig. 8. The two speed assessments for a vehicle were averaged to assign a bench-mark speed limit for each vehicle corresponding to 1.5-in. RMS elevation. This bench mark was used to adjust the absorbed power scale on the basic ride limit-speed curve so that the 6-watt limit was achieved at that speed when the roughness was at an RMS elevation of 1.5-in. Fig. 9 compares computed and experienced 6-watt ride speeds at this roughness. The only trend discernible in the corrections is that of the calculations to overestimate the speeds of vehicles in which the driver's seat is close to the vehicle center of gravity and to underestimate speeds when driver position is well forward.

Ride-limit speeds at other roughnesses were read from the absorbed power curves so adjusted, on the assumption that the general shape of the computer curve was due to major body motions and was essentially valid. An example of a ride-limit curve that required major adjustment is shown in fig. 10 for the M656 5-ton, 8x8 cargo truck. The same basic scale adjustment was used for each vehicle with and without its appropriate trailer. No adjustments were made to calculations for tractor-trailer combinations or other vehicles not covered in the brief experience survey.*

3.2.2 Obstacle dynamics submodel

Once the analog dynamics submodel is set up for the ride dynamics of a vehicle, the vertical acceleration at the driver's seat when the vehicle is crossing single obstacles of various sizes is readily obtained as a special case. In the present study, the analog dynamics submodel was not used. Neither were any simplified analyses available.

* See Addendum 1.

However, from an on-going research program, reliable test data on the speed that produces the assumed limiting 2.5-g vertical acceleration at the driver's seat while the vehicle is crossing standardized, rigid, convex obstacles of various heights were available for four conventional wheeled vehicles (M151A1, M37B1, M35A1, and XM410E1), one fully articulated wheeled vehicle (MEXA 2-1/2-ton, 10x10 cargo test bed[4]), and two conventional tracked vehicles (M113 and M60A1). Examination of detailed test records indicated that, despite later influences from the rear axles, the controlling high acceleration was generally associated with front-axle (or wheel) impact upon returning to base-line level. With this insight, a judicious choice of apparently controlling vehicle parameters, and some dimensional reasoning, an expression for obstacle-limited speed versus obstacle height was developed, which back-fitted the major levels and characteristics of the field data curves quite reasonably. The dimensionless expression used is

$$\frac{V}{\sqrt{Bg}} = \frac{1}{111}\left(\frac{BK}{W}\right)\left(\frac{1}{(h/L)^2}\right)$$

where, in consistent units,

V = vehicle speed

B = distance from axle at equilibrium to bump stop plus one-fifth of tire section height

g = acceleration of gravity

K = total spring rate on front axle as used in the ride dynamics submodel

W = weight on front axle

h = obstacle height

L = wheelbase (Note: Bogied suspension counts as one axle located at center of leaf spring; for pitch-articulated vehicles, measurement is for front unit only.)

This relation was applied uniformly to all of the wheeled vehicles in the study and to the M548A1 5-ton tracked cargo carrier. For the other two tracked vehicles (M113A1 and M60A1)

considered in this study, the available experimental obstacle height-speed relations for 2.5-g level of vertical acceleration were used directly in lieu of the above.*

3.3 Special Output Formats (see section 4.3)

The basic output of AMC-71 is a listing of each terrain unit, with each associated potential speed limit (V-soil, V-ride, etc.) and the final omnidirectional average speed for the unit. Subsidiary listings of terrain and vehicle input values also are available.

3.3.1 Revised basic listing

For the present study, the basic AMC-71 output for each vehicle was consolidated into a sequentially numbered listing of terrain units in decreasing order of final speed-made-good in the unit, as illustrated in table 4. For each terrain unit, the columns in table 4 show:

a. Column 3 - Total percentage of sample distance (or crossings) represented by that terrain unit

b. Column 4 - Accumulated percentage of total sample distance starting with terrain unit in which the vehicle had the highest speed

c. Column 5 - Speed in the terrain unit, mph

d. Column 6 - Distance-weighted average speed in the accumulated distance (4 above), mph

e. Columns 7-9 - Coded diagnostic indications (flags) of reasons for No Go or controlling speed consideration in the unit when the vehicle was operating up, down, and across slopes.

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* Experimental obstacle-height-speed relations used for commercial 5-8 T 8x8. See Addendum II.

The final line in the revised basic listing (table 4, sheet 5) gives the average speed for the total sample distance (or number of crossings). At earlier points in the list can be found average speeds at various other percentages of less severe terrain--as determined by the vehicle itself--or percentage in which average or in-unit speed-made-good does not fall below a given level. The last accumulated distance before in-unit speeds drop to 0.1 mph is the percentage of the total sample that is Go for the vehicle. Samples of each type of information are indicated in table 4.

An analysis of the diagnostic flags is printed out at the conclusion of each listing (table 4, sheet 6). This shows in percent the accumulated distance in which each No Go or speed control was operable for the first 50 terrain units, the first 100 terrain units, etc., and finally for the total sample.

The complete output for the wet-season off-road and on-road performances of the M35A1 2-1/2-ton, 6x6 cargo truck in all three selected study traverses (West Germany, Thailand, and Arizona - see section 4.1) is given in Appendix D as a full example.

3.3.2 Speed profile curves

A special routine was written to display the speed versus percent distance information of the revised basic listing as a curve showing accumulated average speed as a function of percent total distance. These will henceforth be referred to as vehicle-speed profiles. A sample set of profiles for areal terrain speeds and on-road speeds in the three selected study traverses is given in figs. 11-14, inclusive, for the M35A1 2-1/2-ton, 6x6 cargo truck. Off-road areal terrain speed profiles for all the vehicles in the study are given in Appendix E.

4. APPLICATION PARTICULARS

Exercise of AMC-71 in support of the study involved selection and/or development of suitable terrain data, selection and characterization of the vehicles, adoption of an approach for organizing the results, and establishment along the way of some further ground rules to fix a few remaining options.

4.1 Terrain Used in the Study

The terrain in which a given vehicle operates has an overriding influence on its intrinsic performance and also on its performance relative to that of other vehicles in the same terrain. Selection of test terrains accordingly has a major influence on study results.

The detail with which AMC-71 models the complex terrain-vehicle-driver interactions is its main strength, for it systematically and even-handedly examines the coupled effects of individual and combined terrain factors. Corollary to this, use of AMC-71 requires terrain data in terms of quantitative factors and resolutions that are not usually available. The time frame of the present study did not permit extensive new compilation of the requisite terrain data. Rather, available data had to be used to the greatest extent possible.

4.1.1 Areal terrain data

The most time-consuming class of data to collect, primarily because of its relative quantity, is that describing areal terrain. Fortunately, when the study began, complete quantitative areal terrain maps at a scale of 1:12500 for three terrain types of interest were available from on-going research. These maps cover modest samples of cross-country terrain, or transects, (about 3 km by 50 km) in West Germany, Thailand, and Arizona.* Terrain factor

* A fourth transect in Puerto Rico was also available, but was not used; whereas work on one other, in Alaska, was not far enough advanced for it to be considered for use at this juncture.

information for each map permits its use for predictions in wet, dry, and/or average seasons. Specific geographic locations and orientations of the three transects are shown in fig. A1, Appendix A. The section of the areal terrain unit map for the West Germany transect shown in fig. 15 illustrates both the resolution of the terrain unit maps used and the complexity of that particular terrain. Table 5 identifies the areal terrain factors used and the intervals for the factor classes of each, and fig. 16 defines the obstacle geometric factors involved.[5] Complete terrain unit listings by identification number and class numbers for each factor for the West Germany, Thailand, and Arizona traverse or routes over which predictions were made are given in Appendix B.

It must be emphasized that none of the small mapped transects are fully representative of the larger geographic areas with which they are identified. Each was deliberately selected during the research that generated them to represent a distinctly different, typically difficult terrain having some meaningful world-wide importance.

The West Germany transect is considered typical of most of central Germany and similar well-drained, hilly, partially forested upland areas throughout Europe and elsewhere in temperate climates. It is not representative of North European peat country, coastal lowlands, or Alpine topography. The Thailand transect is condidered to be representative of subtropical deltaic and coastal plains under rice agriculture; the Arizona transect to be typical of arid, subtropical desert country outside of major dune areas. A more detailed description of each of the three transects is given in Appendix A.

Clearly, these three transects constitute only a small sample of possible world-wide terrain types. As a small sample, it is unavoidably biased. Nonetheless, the three transects cover both a useful

range of geographic situations of potential interest, and a wide range of complex terrain-vehicle-driver confrontations.

The WSC elected to have its vehicles exercised by AMC-71 over the available West Germany, Thailand, and Arizona transects, all under wet-seasons conditions. Differences in rainfall between seasons in the Arizona transect are so small that soil strengths are unchanged within the resolution of the available terrain data.

To obtain an area-weighted speed for a vehicle in all of the terrain units in a transect, the total relative area occupied by each should be known* and available to the computer in storage with the terrain descriptors for each terrain unit. This kind of time-consuming agglomeration had not been accomplished prior to the study. As an expedient, estimates of areal characteristics were obtained for each area by sampling it continuously along five equally spaced parallel straight lines running its length. The specific paths selected are identified as traverses. Sections of these sampling lines are shown in fig. 15. All unit terrains crossed were recorded, and the total distance in each was accumulated. These totals were normalized on the basis of the total length of the five lines, and the area was considered as though it was made up wholly of the terrain units encountered, in the resulting proportions. The following tabulation shows a comparison of the total number of terrain units in each transect with the number picked up by this sampling procedure.

Mobility Transect	Total Number of Areal Terrain Units	Number Used in Study
West Germany	1411	481
Thailand	485	255
Arizona	405	242

* Note that a single terrain unit may be found only in one connected patch within a traverse, or as a number of discrete patches throughout. For the present analysis, relative occupancy only is required, regardless of continuity or distribution.

4.1.2 Linear terrain data

The linear terrain (rivers, streams, canals, etc.) used in the study was that occurring within the three selected transects. None of the needed detailed quantitative data were available prior to the study, however.

Within the operative time constraints, the requisite linear terrain data for the West Germany transect only could be compiled from available sources. This was done by using the WES European Waterways Study[6] 1:50000-scale military maps of the area and estimates of physical characteristics based on river regime analogs[7] to characterize each of the 124 intersections of the five areal sampling lines (260 km) with identifiable linear features.

Linear terrain factors and the class intervals used to characterize them are given in table 6. The geometry terms are defined in fig. 17. The quantitative data used in this study on the river terrain units in the West Germany transect and their relative occurrence are given in the listing of linear terrain units in Appendix B.

Following a preliminary analysis, 28 crossings (comprising 17 different river types) were found to be No Go for all of the wheeled vehicles in the study, and these were eliminated from the final evaluation of times required by all vehicles for negotiation of linear features. This was done on the premise that no realistic mission would require negotiation of crossings of this severity by any vehicle without preplanned engineer support. Those terrain units eliminated on this basis are identified in the listing in Appendix B.

4.1.3 Road data

The road networks selected for the study were essentially those existing in the three study transects. Although needed quantitative data for these were not available prior to the study, data for all three areas were compiled for the exercise. The West Germany roads quantified during the study are those occurring on the

DEUTSCHLAND 1:50000 series M745 map sheets L6918 and L6920 between grid lines 6918 and 6920. Geographically, the boundaries are 49° 03' 26" N latitude and 49° 00' 44" N latitude, and 9° 20' E longitude and 8° 40' E longitude. This approximates about one half of the West Germany transect. The Thailand roads are those occurring on the THAILAND 1:50000 series L708 map sheets 5153 I, 5154 I, 5154 II, and 5155 II, with the boundaries 14° 10" N latitude, and 14° 50' N latitude, and 100° 45' E longitude and 101° 00' E longitude. The roads quantified near Yuma, Arizona, are those occurring on the ARIZONA 1:50000 series V978 map sheets 3149 I and 3149 IV. The boundaries are 33° 00' N latitude and 32° 45' N latitude, and 114° 00" W longitude and 114° 30' W longitude.

Preliminary study of the maps indicated that all roads in all areas could be readily grouped from the map legends into three usable types:

a. Primary or type 1: Surfaced all-weather roads, two lanes or more

b. Secondary or type 2: The balance of all-weather roads, generally unpaved but improved, plus paved roads less than two lanes wide

c. Trails or type 3: Unimproved and fair weather roads and trails of at least one vehicle width

Each type was quantified separately in terms of the road factors, factor classes, and ranges, as shown in table 7. Each unique combination of factor classes denotes a "road unit," fully analogous to a terrain unit as used in the off-road model.

Within a type, readily identifiable from the map legend, slope and curvature were measured directly from the maps. Slope was obtained by measuring distances along the roads between contour lines. However, since the contours did not indicate road cuts or fills, some judgment was required to account for these road construction practices. To approximate this, maximum slope in any type 1 road segment was limited to 7 percent (slope types 1-3); that on any type 2 road to 27 percent (slope classes 1-7). Type 3 roads were assumed to follow

the natural slope of the terrain and had no slope limitations imposed.

Road curvature is defined as the angle at the center of the curve subtended by an arc of 100 ft.[8] Curvature was measured from the maps with templates at the same scale. A curvature class could be assigned to each curve or intersection discernible at the 1:50000 scale. At each intersection, all of the measured curvature was assigned to the lower class of road involved, or where roads of the same type intersected, to the shorter section or to the non-through road as appeared appropriate. Through villages and cities, only the primary roads were followed and road units defined accordingly.

Every unique combination of the factor classes for road type, slope, and curvature was assigned a road unit number; and all distances were identified with each number accumulated. The two remaining factors in the complete road unit quantification, surface strength and roughness, were assigned indirectly as described below.

All type 1 and type 2 roads were considered to have adequate bearing capacity for all vehicles, even in the wet season. Accordingly, constant motion resistance coefficients were assigned for all wheeled vehicles: 40 lb/T for type 1 roads (essentially paved), and 70 lb/T for type 2 (essentially gravelled).[9] On the basis of experience and judgment, wet-season surface strength of type 3 roads in West Germany and Thailand was arbitrarily related directly to the drainage situation and, hence, to recorded slope, as follows:

a. Slope less than 2 percent; poorly drained: RCI = 61-100 (strength class 5)

b. Slope 2.1-7 percent; moderately drained: RCI = 101-150 (strength class 4)

c. Slope greater than 7 percent; well drained: RCI = 151-220 (strength class 3)

Surface strength for type 3 roads in the Arizona traverse was assumed to be as great as the soil strength in the surrounding area, which was generally greater than 280 cone index. Thus, for Arizona, RCI = 280 was used for all type 3 roads.

No special relation for surface slipperiness was introduced; however, to account for the general loss of traction on wet roads, traction on all roads was reduced by 20 percent.[10]

Since surface roughness patently could not be measured on the 1:50000 maps, type 1 roads were assumed to be relatively smooth and free of surface irregularities, type 2 roads somewhat less smooth, and type 3 roads much less smooth. Accordingly, a minimum surface roughness of 0 to 0.4-in. RMS elevation was assigned to type 1 roads. To account for expected variability in the other two types, surface roughness values of 0 to 0.4-in, and 0.5- to 1.5-in. RMS elevation were allowed for type 2 roads, and 0 to 0.4-in., 0.5- to 1.5-in., 1.6- to 2.5-in., and 2.6- to 3.5-in. for type 3. In these latter two classes, one of the allowable values was randomly assigned to each road unit. Long road units (more than 20 percent of the total) were divided into equal parts, and one of the allowed roughnesses was assigned to each. Road unit distances in the results were normalized in the same manner as off-road traverses.

Roads in each type were sampled within each transect until a total of approximately 100 km per type had been characterized. As expected, total mileage in the three classes was generally least in type 1 and greatest in type 3. Where there was not a total of 100 km of a type within the traverse, the sampling area was extended into similar terrain laterally on each side until the requisite mileage was reached. Where total mileage of a type within the transect was far in excess of 100 km, appropriately reduced areas within the transect were sampled to obtain at least 100-km total traverse. These were spotted about the total transect area so as to reflect apparent differences in road density, relief, land use, etc.

The road unit maps were constructed in the same manner as off-road linear terrain maps. The road unit maps for type 1 and type 2 roads in the Western Germany traverse are shown in fig. 18. Fig. 19 shows the location of areas used in sampling type 3 roads, and fig. 20 one of

the samples. Table 8 summarizes areas and road lengths (in miles) sampled for each road type in each traverse, and associated road densities. Complete road unit listings by identification number and class numbers for each factor in West Germany, Thailand, and Arizona are given in Appendix B.

4.2 Vehicles Considered in the Study

The 48 vehicles, modifications thereof, and vehicle-trailer combinations of direct interest to the WSG were selected by that group. Six* additional vehicles also were characterized, three wheeled and three tracked, as experience references. All 54 are listed in table 9** along with a summary of some of salient characteristics and performance parameters. In Appendix C, the quantification of parameters for each vehicle and vehicle-trailer combination necessary to implement AMC-71, including relations obtained from the dynamics submodel, is tabulated as inputted to the computer files. Sources from which requisite data were compiled are shown in table 3.

The values characterizing the vehicles, and, of course, the final outputs as well, reflect the following ground rules established jointly with the WSG:

a. All military vehicles and trailers were run, both off and on road, with the payload specified in Army characteristics data sheets for off-road and cross-country operations.

b. Each commercial configuration was run with the same payload as the military vehicle with which it was nominally competitive.

c. Soil and dynamics performances were calculated in all cases at tire pressures recommended in the characteristics data sheets for off-road use, except that for operations in coarse-grained soils,

* Plus three additional wheeled vehicles, see Addendum II.

** See Addendum I for updated dynamics performance data on some vehicles; Addendum II for data on three additional vehicles.

soil predictions were based upon maximum practical tire deflections (i.e. further reduced pressures) taken in all cases as 25 percent of the tire section height.

d. Maximum operating or towing speeds for specific vehicles and trailers were imposed where officially recommended (see Appendix C). Consultation with the U. S. Army Artillery Board indicated that no towing limits were necessary for the few vehicle-howitzer combinations included.

4.3 Organization of Results

In light of both the further uses to which the WSG proposed to put the AMC-71 output and the time limitations, a statistical representation of each vehicle's predicted performance was deemed appropriate. The basic statistical measure selected was average off-road speed within an area and, separately, average speed on the associated roads (appropriately classed). For present purposes these average speeds would be defined as simple area (or distance) weighted averages of maximum speeds within the terrain units (or road units), without consideration of accelerations and decelerations during transitions from one terrain unit to the next. This greatly simplified the necessary organization of terrain data and its final interpretation.

Further, it was recognized that at least two levels of off-road mobility were involved in the Army's long list of missions. For forward-area missions requiring the highest mobility, average speed in the area as a whole, including delays for crossing linear terrain features encountered, was deemed appropriate.*

* Since lack of precompiled, detailed terrain data (section 4.1.2) in fact made it possible to develop linear terrain crossing-time predictions for the West Germany transect only, both the speed for 100 percent of the areal terrain units only (denoted V_{100}) and speed with linear terrain crossing delays added (V_{110}) are shown for this traverse, and V_{100} only is given for the other two (see table 10).

For medium-mobility missions, where avoidance of some of the least favorable sections of terrain would be normal and acceptable, average speed in that part of the areal terrain left after eliminating the worst 10 percent of the area was accepted as more realistic (V_{90}).

A subsidiary statistic desired was the percentage of the area in which the vehicle was mobile (percent Go). The routines to output these figures, plus some diagnostics, have been described in section 3.3.

5.0 SUMMARY AND DISCUSSION OF RESULTS

5.1 Results

Off- and on-road average speeds (mph) predicted by AMC-71 for all vehicles in each of the three study traverses are summarized in table 10.* The vehicles are ordered by payload class with military and commercial vehicles with front-wheel drive denied included in each. Predictions for reference tracked and wheeled vehicles are grouped at the end of the table. For each traverse, columns from left to right present:

a. V_{110} - West Germany traverse only; average speed in all terrains, including crossing times for linear features, except the approximately 25 percent judged to require engineer support at all times

b. V_{100} - Average speed in all areal terrains (i.e. with no stream crossings)

c. V_{90} - Average speed in 90 percent of areal terrain in which each vehicle maintained the highest speeds

d. V_3 - Average speed on trails and fair-weather roads (type 3)

e. V_2 - Average speed on unsurfaced, all-weather roads (type 2)

f. V_1 - Average speed on surfaced roads (type 1)

g. Percentage of areal terrain in which operation was Go

h. Percentage of type 3 roads on which operation was Go

Table 11** summarizes the No Go or speed-controlling terrain-vehicle interactions for each vehicle in each areal terrain in terms of the percentage of traverse distance in which each such interaction was operative.

These predictions answer the basic WSC questions concerning off- and on-road performance of standard military and commercial vehicles and vehicles with front-wheel drive denied, with and without trailers, for the three traverses. In a few cases, vehicles were towing howitzers.

* Table is updated to reflect results shown in Addenda I and II. Original predictions are preserved in Addendum I.

** Original results only, plus three additional vehicles.

They consider no route selection or optimization beyond that reflected in the V_{90} speed. Performance predictions are for wet-season operation of a single vehicle, and do not include any influence of possible local slipperiness or pronounced layering in soil strength.* They include arbitrary, but reasonable, time penalties for negotiating No Go situations as needed to cover the terrain to the extent intended (100 percent with/or without stream crossings, or 90 percent). Questions concerning tire tread or differential design are not addressed.

Whereas the principal speed predictions refer to single vehicle operation, table 12 illustrates for four sample vehicles the order of degradation in off-road performance that can be expected when the number of vehicles involved in an operation is so large that as many as 50 vehicles must pass essentially in file during cross-country travel. Table 13 presents, for the tractor-trailer combinations in the study, predicted maximum speeds possible when the vehicles are negotiating smooth paved roads up a 3 percent grade, down a 3 percent grade, and on the level, with a 70-mph absolute speed limit imposed.

5.2 Realism and Reliability of the Results

The usefulness of the results to the WSG depends on a clear assessment of their limitations. If the logic of AMC-71 is acceptable and properly executed, there are still five broad classes of errors that could be involved.

a. Type I: Input errors, either in vehicle characterization or in terrain information, starting at the basic source, but possible right through to typographic errors in entering the data to the computer

b. Type II: Errors in the submodels that determine physical response

c. Type III: Errors arising because of the particular treatment of terrain data in terms of class intervals

d. Type IV: Output errors in transcribing computed results to

* Or, in the West Germany transect, of possible snow cover.

final reports, curves, and analyses--trivial, but potentially as disruptive to the results as any other

e. Type V: Interpretation errors due to ignoring or misunderstanding assumptions and limitations

Preceding sections have outlined basic limitations of AMC-71 and the assumptions used, including those specifically made to handle this study. Error type V will be addressed in the following paragraphs by examining the apparent influence of the AMC-71 limitations upon the results in context of other postulated error types (except IV, which, along with transcription errors in type I, have been largely eliminated by methodical checking).

5.2.1 Terrain used

The most cursory examination of table 10 shows that terrain inputs, as expected, have a major influence upon all off-road speed predictions. Accordingly, it bears repeating that the three study transects must not be construed as representing the entire geographical area by which they are conveniently designated.

Supplementing the controlling descriptions presented in Appendix A, the vehicles in the study have generated a vehicle-oriented analysis of the areal features of the traverses. Table 14 shows how the traverses "appear" to three high-mobility vehicles (whose viewpoints are remarkably homogenous); and as they are "seen" by three standard mobility vehicles with their performance levels reduced by front-wheel drive denial (whose concensus, while clear, is not quite as sharp). In terms of areal features, the Thailand traverse is most restrictive to vehicle performance. It is characterized by weak soils (affecting the low-mobility vehicles) and numerous obstacles (rice paddy dikes), which affect the high-mobility vehicles to which the soils per se do not present a major impediment. The West Germany traverse is the most varied, with roughness, vegetation, soils, and slopes all strongly influencing the overall performance. The Arizona traverse from a vehicle standpoint is mainly obstacles (erosion features) and roughness.

5.2.2 Simplified ride dynamics modeling used

Tables 11 and 14 show that the final speed predictions in all traverses were affected strongly by the 6-watt ride level (West Germany and Arizona) and/or the 2.5g obstacle-crossing speed limits (Thailand and Arizona) assigned to the vehicles by the simplified dynamics modeling outlined in 3.2. Where the ride dynamics computations used were tuned to experience prior to final traverse predictions (as for most standard military vehicles), estimates of ride speed limits for a given vehicle may still be subject to as much as a ±25 percent error in some of the less severe terrain roughness classes. In the case of vehicles (including all of the commercial machines) where such tuning was not feasible some estimates from the modified V-ride model could be in error by twice this amount.*

Because, in the off-road situation, ride speed limits generally come into command at relatively high speeds, their influence on overall average speeds is small (less than ±10 percent for a ±25 percent speed variation, even when ride limits account for 50 percent of the controls). Moreover, in a typical terrain unit in which ride speed is selected as limiting, other limits (power or visibility, for example) are frequently not much higher, so that a large error in the ride speed limit on the plus side would in practice often be effectively truncated by replacement by another lesser limit in assigning the in-unit speed. Thus, the best estimate is that possible errors in the average off-road speeds shown due to simplification in modeling the ride dynamics are probably less than +5 percent to -10 percent for standard military vehicles; +10 percent to -20 percent for all others.

The dynamics obstacle-override speed situation is similar, but in the worst cases, as for the more mobile vehicles in the Thailand and Arizona traverses, where as many as 75 percent of speed controls involve this limit in conjunction with the acceleration-braking submodel for the vehicle, final averages may be in error by 10-20 percent in some cases. The ride and obstacle dynamics submodels are totally

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* See Addendum 1.

independent, however, so there is no reason to expect any systematic correlation in the two errors.

5.2.3 Terrain factor class intervals

The basic terrain data represent the actual continuum of each terrain factor value in terms of practical class ranges. As noted in section 2.4, AMC-71 presently examines performance by using only the midrange value for each terrain factor class, thereby replacing nature's continuum by a step function. For this reason the possibility exists for assigning a Go to one of two vehicles and a No Go to the other, on the basis of very small differences in directly related vehicle characteristics. Where the terrain is sufficiently varied, such occasional, exaggerated discriminations will generally give only a slight and acceptable advantage to the more favorably configured machine. Where, on the other hand, the terrain factor class involved is extensive, the resulting distortion can produce wholly unrealistic differences in the performance predictions for two vehicles that vary but little with respect to only one characteristic. Preliminary runs showed that this was occurring with the 3/4- and 1-1/4-ton vehicle predictions in the Thailand traverse, which is characterized by many rice paddy dikes of man-made uniformity. The model was calling No Go's for 70 percent of the area for the M715E1 and XM705 vehicles, and passing the M37B1 on the basis of less than 1/2-in. difference in ground clearance. This was clearly unrealistic. After an examination of the total situation, the ground clearances of the M715E1 and XM705 were arbitrarily increased for computation purposes to that of the M37B1 and the off-road speed predictions were rerun. Results given in tables 10 and 11 reflect these judgment calls. There appeared to be no other important distortions in using the terrain data in this way.

5.2.4 General internal consistency

Tables 15 and 16 extracted from table 10, organize predictions for a number of standard military vehicles for quick, critical

comparison. Table 15 shows percentage or areal terrain that is Co, and table 16 gives V_{100}. The vehicles are grouped by payload class, arbitrarily classed as high, standard, or low mobility on the basis of apparent design intention; and each table presents one type of prediction for each vehicle in each of the three traverses. All off-road speed profiles for these vehicles are included in Appendix E.

Still another crosscut of the basic predictions is presented in figs. 21-24* for the vehicles listed in tables 15-16. These histograms show percentages of the areas in the three traverses under the several No Co and speed controls for several standard military vehicles, again arranged to facilitate direct comparisons. Fig. 21 shows as base lines the M35A2 2-1/2-ton, 6x6, and the M151A2, 1/4-ton, 4x4 trucks. Fig. 22 compares the 5-ton payload class, high-, standard-, and low-mobility vehicles; fig. 23, the standard vehicles (without towed loads) in the 3/4-ton and 1-1/4-ton-payload classes; and fig. 24 those in the high-mobility class. (Legend material for all four figures indicate a reassuring degree of internal consistency. Progressions are orderly, reasonable, and/or explicable.

The reduced performance of the 1/4- and 1/2-ton vehicles in the Thailand traverse (tables 15 and 16) is due largely to their inability to surmount the characteristic rice paddy dikes. Performance of the M520E1 and the M813 in the same area are reduced, as compared to that of some of the other vehicles, essentially by their higher soil strength requirements.

The progression of speed controls from one factor to another is well illustrated in fig. 22. The high-mobility vehicle (M656) had only minor difficulties with soil strength in any of the three traverses, and speed control accordingly passes to other factors. In the West Germany traverse, speeds were limited in decreasing order of areal frequency by ride (factor 5), the need for maneuvering to avoid large trees (factor 8), slopes with soils effects included (factor 6), visibility as limited by vegetation and braking (factor 7), resistance as augmented by the need or choice to override vegetation (factor 9), and,

* Not updated per Addendum 1.

finally repeatedly slowing to cross an obstacle and then accelerating again (factor 10). In the Thailand traverse, for the M656 while encountering a few obstacle hangups (factor 3) and obstacle traction (factor 4), No Go was largely limited by obstacle crossing speeds with related acceleration and deceleration (factor 10). When the going was otherwise good, visibility (factor 8) finally limited speed to less than the power maximum. In the Arizona traverse, obstacle crossing (factor 10) dominated; whereas, because of the sparsity of vegetation, visibility was not limiting, and ride speed (factor 5) became critical, still below the flat-out power limit. Note, however, that engine power and gearing enter significantly into all obstacle-controlled speeds (factor 10) through the acceleration capabilities of the vehicle.

The standard-mobility M813 (fig. 22) has a similar control profile in the West Germany traverse; but in the Thailand traverse, it encountered soil strength No Go's (factor 1), and in the obstacle fields ride (factor 5) limit speeds to less than its acceleration capability would allow (factor 10). Visibility (factor 7) played a lesser role because speeds were generally reduced. Ride and obstacle factors (5 and 7) trade off in the same way in the Arizona traverse.

The low-mobility M818-M127A1 truck-tractor combination (fig. 22) encountered serious soil No Go's in West Germany and Thailand traverses (factors 1 and 2), and traction difficulties even in Arizona (factor 2). A relatively small percentage of No Go area quickly degraded overall average speed-made-good because travel time accumulated rapidly when forward progress was at the rate of only 0.1 mph, even when distances were relatively short.

Figs. 23 and 24 illustrate the same points, and again show good internal consistency.

5.2.5 Treatment of vehicle articulation

Of the two articulated vehicles among the WSG vehicles, the M561 1-1/4-ton, 6x6, and the M520E1, only the former is pitch articulated. Since AMC-71 presently looks only at vehicle motions in the

center line vertical plane, only the M561 appeared to it as articulated. The minor special modeling incorporated to handle ride and obstacle dynamics and possible obstacle hangups (for it and for towed units) seems to have worked reasonably well.

Although no attempt was made to model the special advantages of pitch articulation in negotiating really big obstacles at the Go-No Go level, this omission appeared to have been the limiting factor in 1.8 percent of the areal terrain units in Thailand only, so that the possible effect of underestimating the M561's overall performance due to the omission is minor. In still other terrains this would not necessarily be true, of course.

5.2.6 On-road performance

While the first-cut on-road performance module of AMC-71 appears to have provided internally consistent estimates for the military vehicles for which experience adjustments to calculated ride speed limits were available (see Table 18) predictions for the tractor-trailer and commercial vehicles on type 2 and type 3 roads are suspect because of the controlling influence of ride speed limits. As shown in Fig. 9, needed adjustments were frequently large, especially for the heavier vehicles. Moreover, factors which attenuate ride-speed errors in their effects upon overall off-road speed predictions, discussed in 5.2.2, are not operative in the more limited on-road "terrain," nor in the on-road speed range.*

Power and gearing differences among vehicles, which might be expected to appear in type 1 (primary) road performance, were, in fact,

* The asterisk notation (**) in the table of results, Table 10, denotes cases where field tests run after the main report was completed established experimental ride-speed limits which differed sufficiently from the calculated values used to warrant adjustment of the predictions. See Addendum I.

really negated for the truck tractor-trailer combinations by the imposition of official trailer towing speed limits. Table 18 shows for these rigs the effects upon overall speed on the type 1 road networks of effectively eliminating these limits. (Engine RPM limits were still operative, of course).

5.2.7 Comment

Each vehicle design is a unique mix of design features optimized within constraints of required performance, available technology, reliability, maintainability, transportability, producibility, and first- and lift-cycle costs. Available technology and the weighting of constraints change with time; performance and reliability change with mission and the terrain and environment in which the mission must be carried out. The multitude of necessary trade-offs, even in the third decade of the computer age, must still be made largely on the basis of individual judgments, some reliable, some not.

The vehicles whose performances are examined in the present study differ widely in date of development and in mission function. None have been systematically assessed by so complete and even-handed a procedure as has been done here by the employment of AMC-71. The results speak well of the evolutionary design process in the development of military vehicles, and also lend considerable credence to AMC-71 in this broader application to include nonstandard vehicles.

Because of the overriding influence of terrain upon the performance of any vehicle, special care has been taken to describe and analyze the terrains used in the study, so that the results can be properly interpreted. While the study terrains were limited by the Project WHEELS time frame, they appear, among them, to provide an adequate basis for discriminating among performance qualities of the study vehicles in a broad range of missions. However, the observed sensitivity of predicted performance to the particular terrain examined emphasizes that a definitive performance evaluation demands consideration of a

broad spectrum of environmental conditions truly representative of the operational theater.

The above and other caveats associated with AMC-71's incomplete state-of-development have been offered, and areas where the existing objective methodology has been tempered with judgment have been identified. On-going research to validate and improve AMC-71, greatly stimulated and focused by this contact with the real world, will result in an increasingly realistic, increasingly useful tool as time goes on. But no apologies are in order for the present effort. It is the best that current technology can offer, and it is the strong conviction of the authors that future application of similar methodology by designers and developers will result in a substantial upgrading of the effectiveness of the U. S. Army vehicle fleet.

5.3 Ranking the Study Vehicles

The objective of the AMC-71 mobility model evaluations in relation to the overall WHEELS Study was to provide one of the basic elements needed to examine possibilities for cost savings in the military truck fleet through the substitution of commercial vehicles and/or the elimination of some special mobility features, such as all-wheel drive. Obviously, some dollar costs can be saved, but at what cost in accomplishing military missions? Full exploitation of the results achieved herein requires consideration of the missions a given type of vehicle is required to perform, and the environment in which they must be performed.

The most austere approach in examining possible trade-offs is to rank all of the study vehicles preparatory to formulating conditions for substitutions acceptable from a performance viewpoint. Tables 19-21, inclusive, present such a ranking of the 48 vehicles and vehicle combinations of direct interest to the study,* based upon V_{90} speeds in each of the three traverses, with V_{90} (areal terrain units) and percent No Go noted for each vehicle. Where the predicted speed was the same

* Updated per Addendum I, with results for three additional vehicles (Addendum II) integrated.

for several vehicles, the vehicles were ranked according to their item number in table 10. Reference vehicles (49-54) are not included in the list. The ranking varies somewhat with the terrain, and percentage of No Go is not strictly related to the V_{90} rating. Note also that the ranking is, in many instances, based upon very small differences in predicted performance, differences that are well within the actual resolution of the model accuracy. While the ranking shown is the best estimate, changes in rank due to V_{90} speed differences of less than 1 mph are probably not significant.

Tables 22-24, inclusive, give similar rankings based upon average speeds on secondary (type 2) roads (V_2), with speeds on primary (type 1) roads (V_1) also shown.*

Two more elaborate procedures for assessing the relative mission performance of the vehicles have been proposed, both involving some judgment of mission requirements by experienced military professionals. The first establishes a number of mission classes and, for each, appropriate weighting factors for various aspects of overall performance (V_{110}, V_{100}, V_{90}, V_3, V_2, V_1, and perhaps others). These can be applied to an array of the AMC-71 results to provide mission-oriented quantitative indexes of relative vehicle suitability for each mission in each terrain. Even at this point, however, some further judgments are still required, because ratings and rankings applicable directly to mission performance again vary somewhat with the terrain.

A second suggested alternative is to establish experience bench marks in terms of known vehicles, terrains, missions, and minimum acceptable speeds. The appropriate vehicle off-road speed profiles (Appendix E) are then entered to establish for each mission and terrain a corresponding bench mark percentage of traverse, and nominal competitors for the task rated at that percentage. This can be done directly from the off-road speed profiles for the competing vehicles.

Such further analyses of the results involve considerations beyond the scope of the AMC-71 model and of the field of professional competency of the mobility team. They were not attempted as a part of the mobility evaluation.

* Updated per Addendum I.

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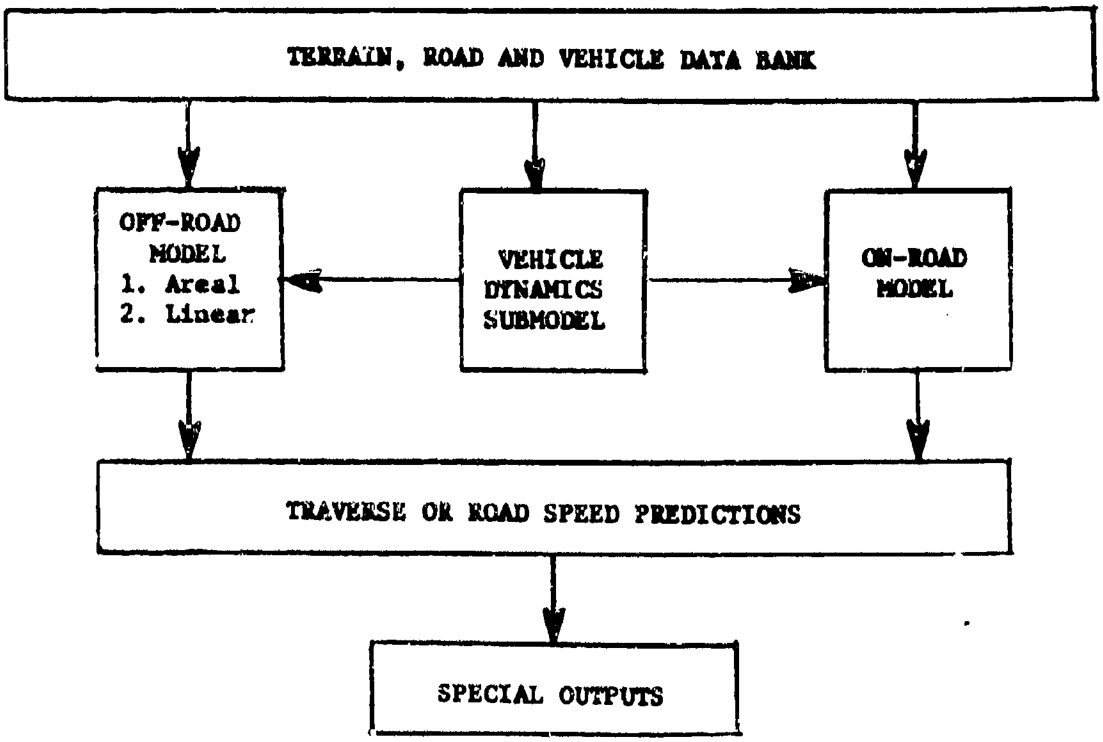
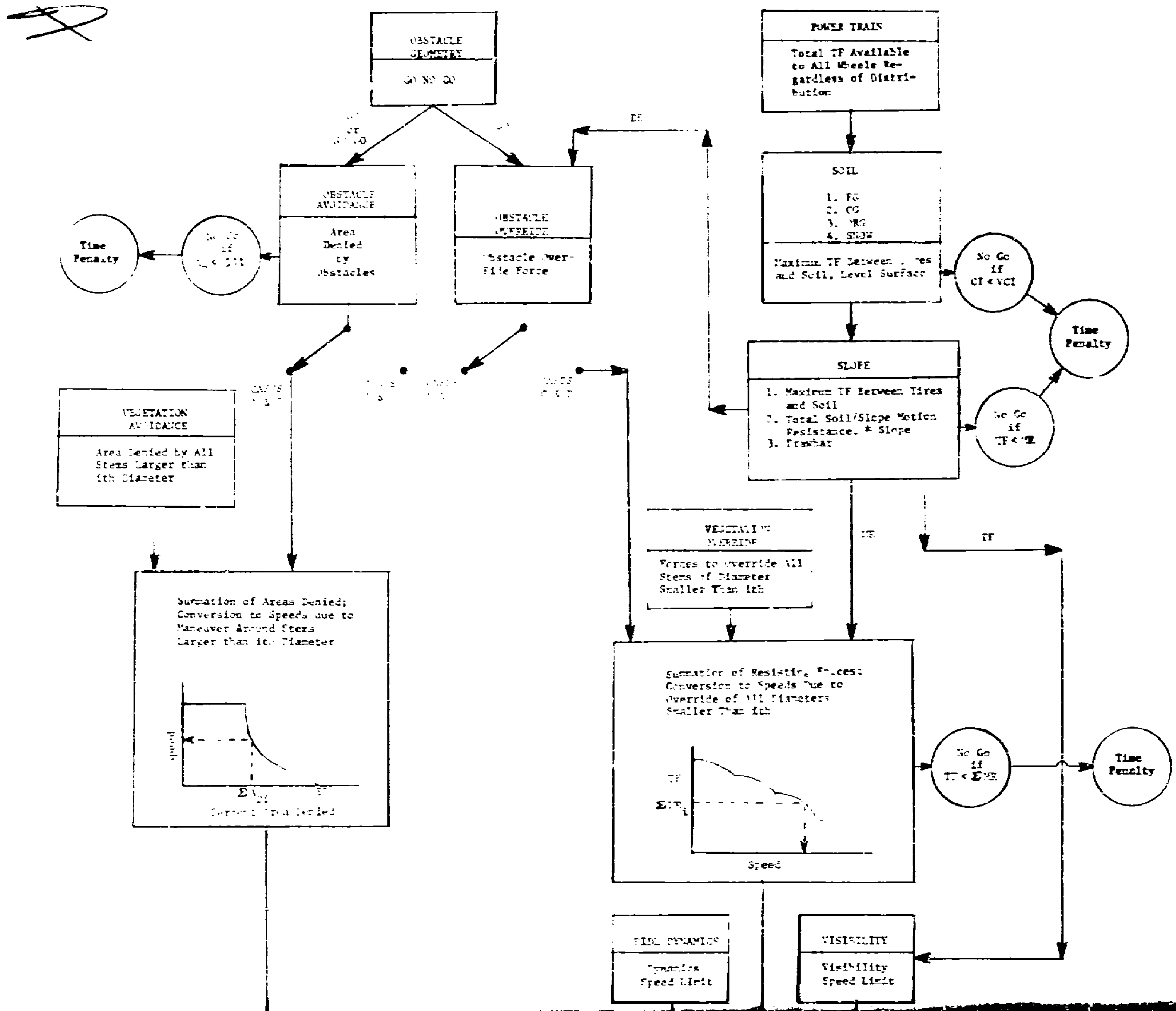
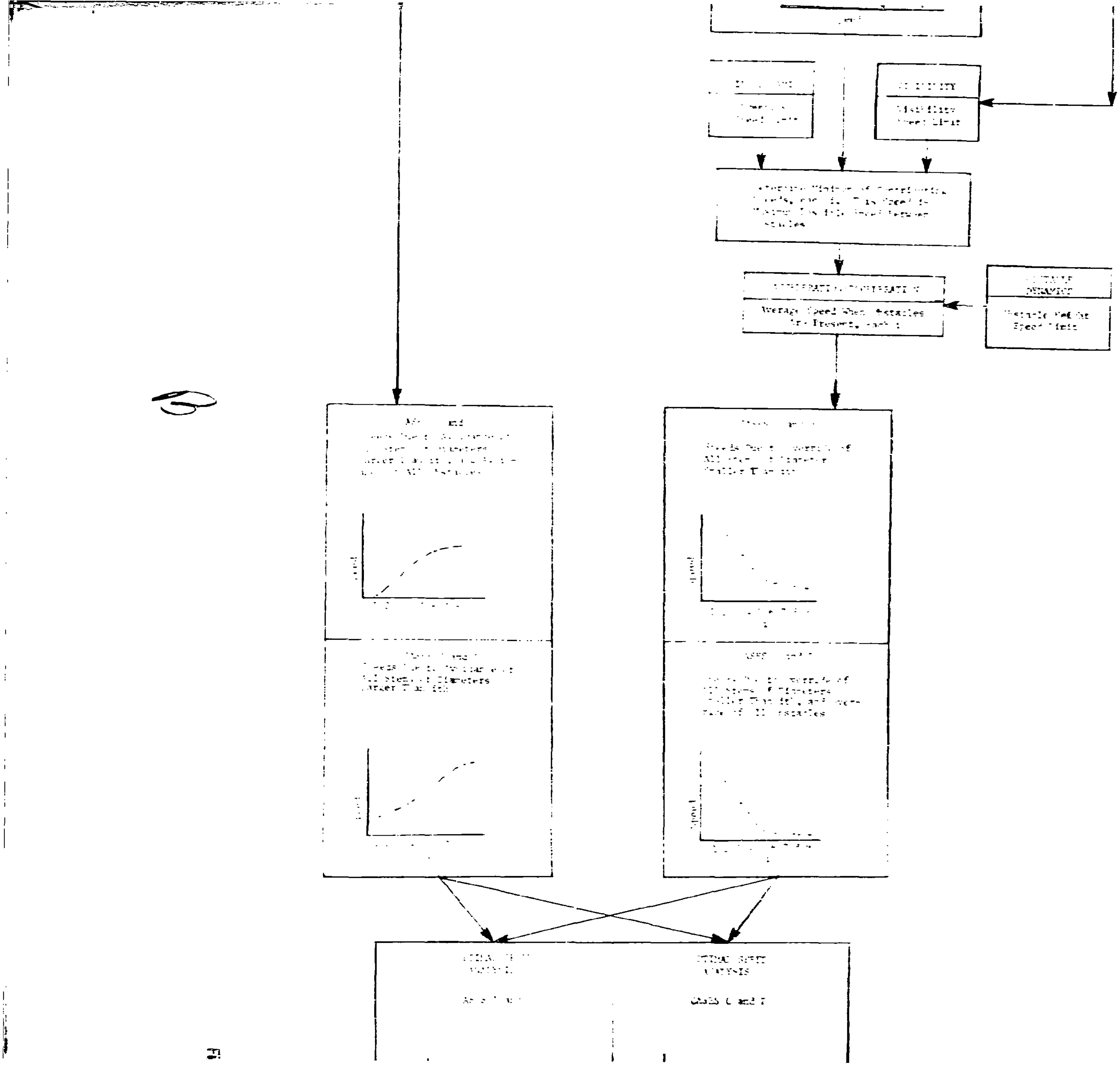


Fig. 1. General flow diagram of AMC-71 Ground Mobility Model

OFF-ROAD MODEL (AREAL)




Visibility
Speed Limit
DYNAMICS
Speed Limit
Speed
Speed
Speed
Speed
CASES 6 and 7

Fi

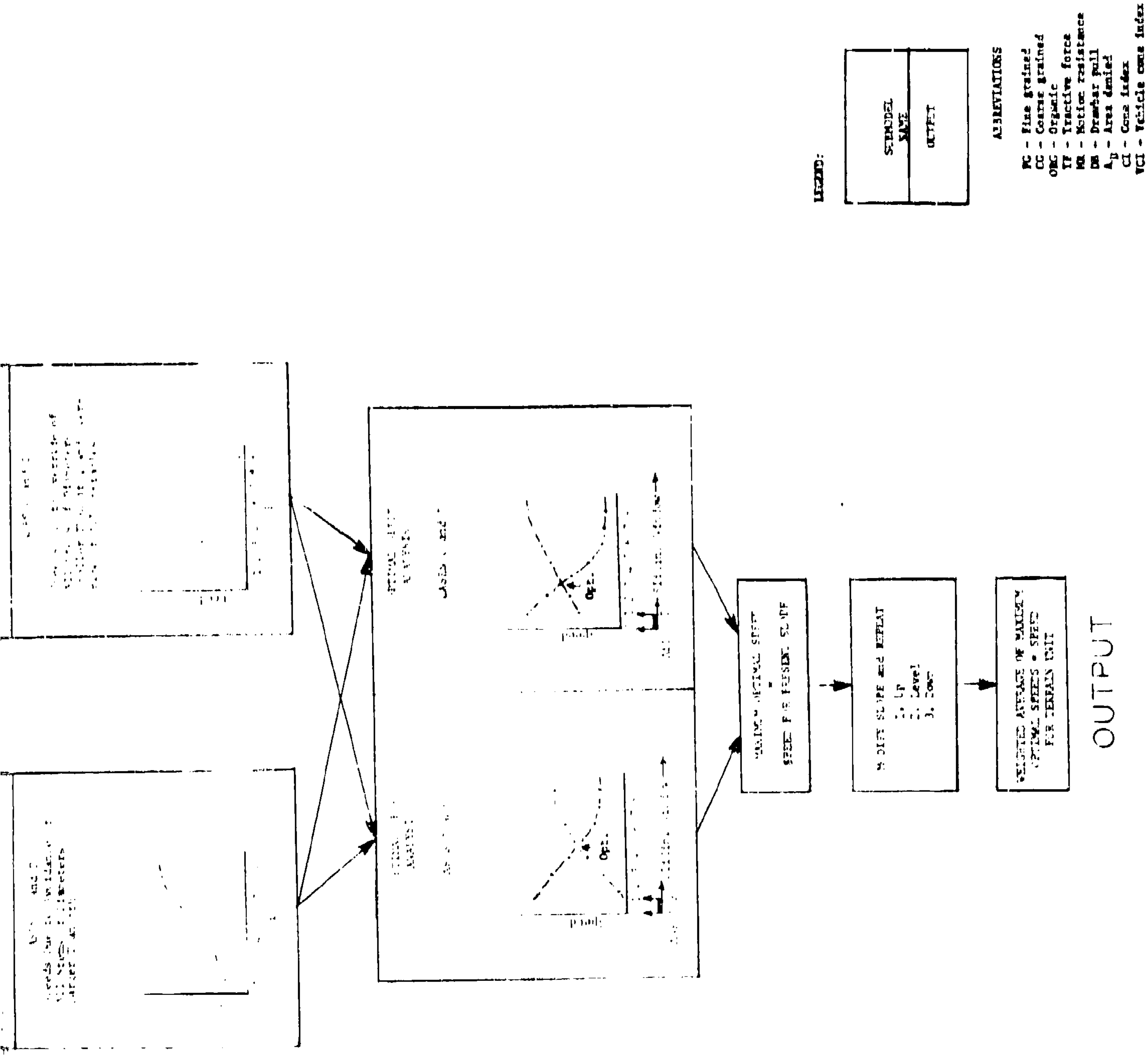


Fig. 2. Schematic diagram of areal terrain unit performance prediction module

LEGEND:

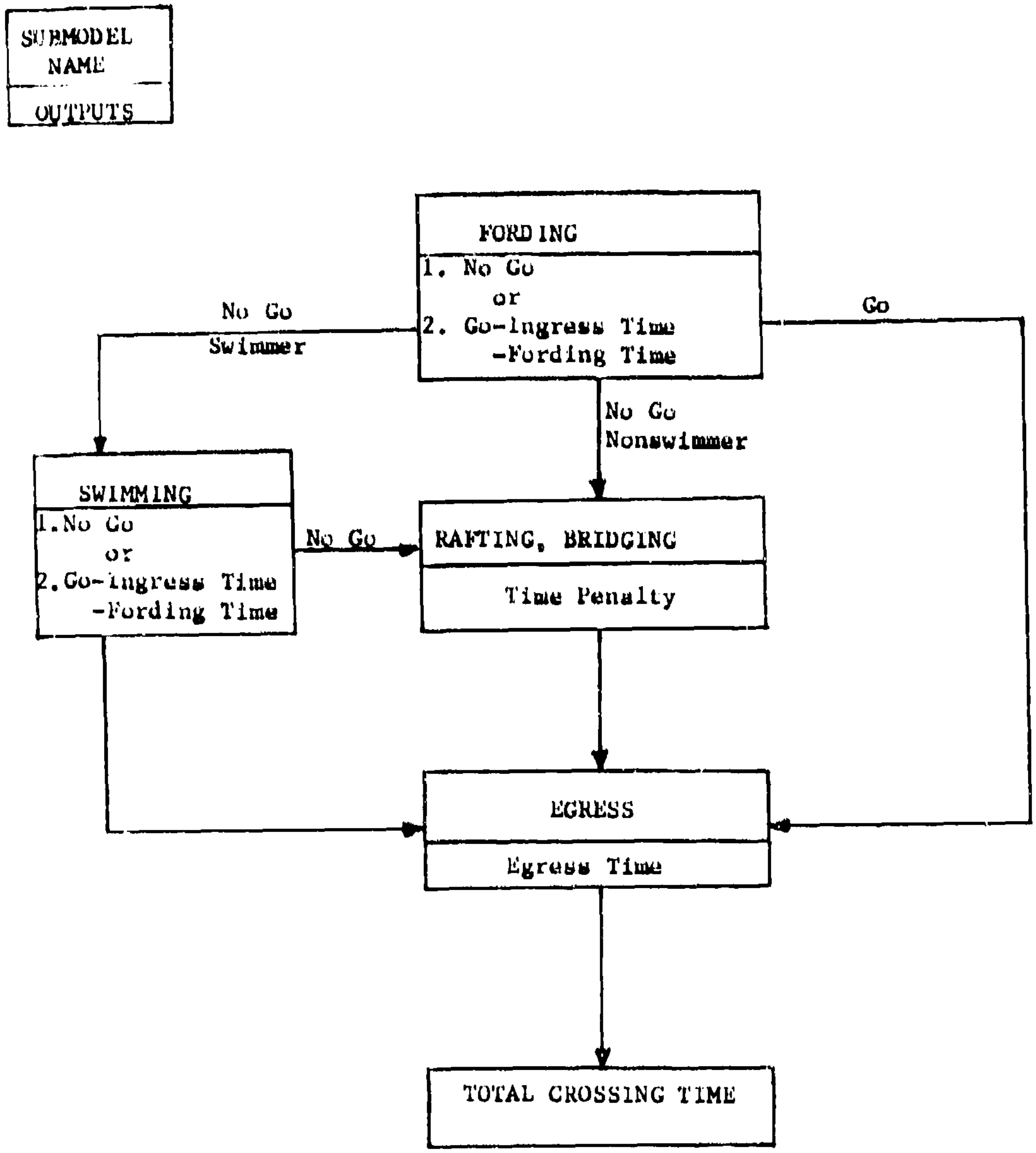


Fig. 3. Schematic flow diagram of linear terrain unit performance prediction module

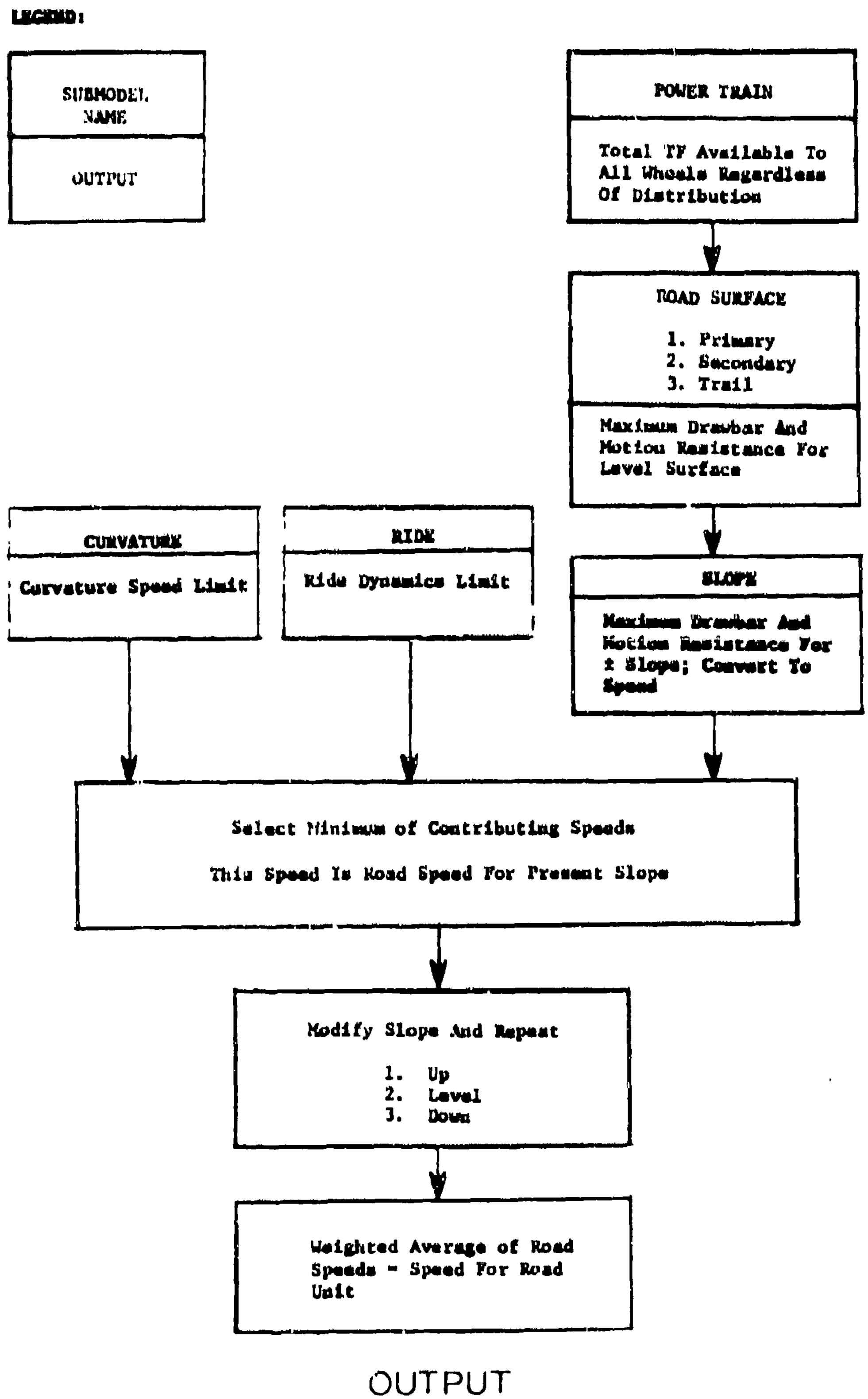
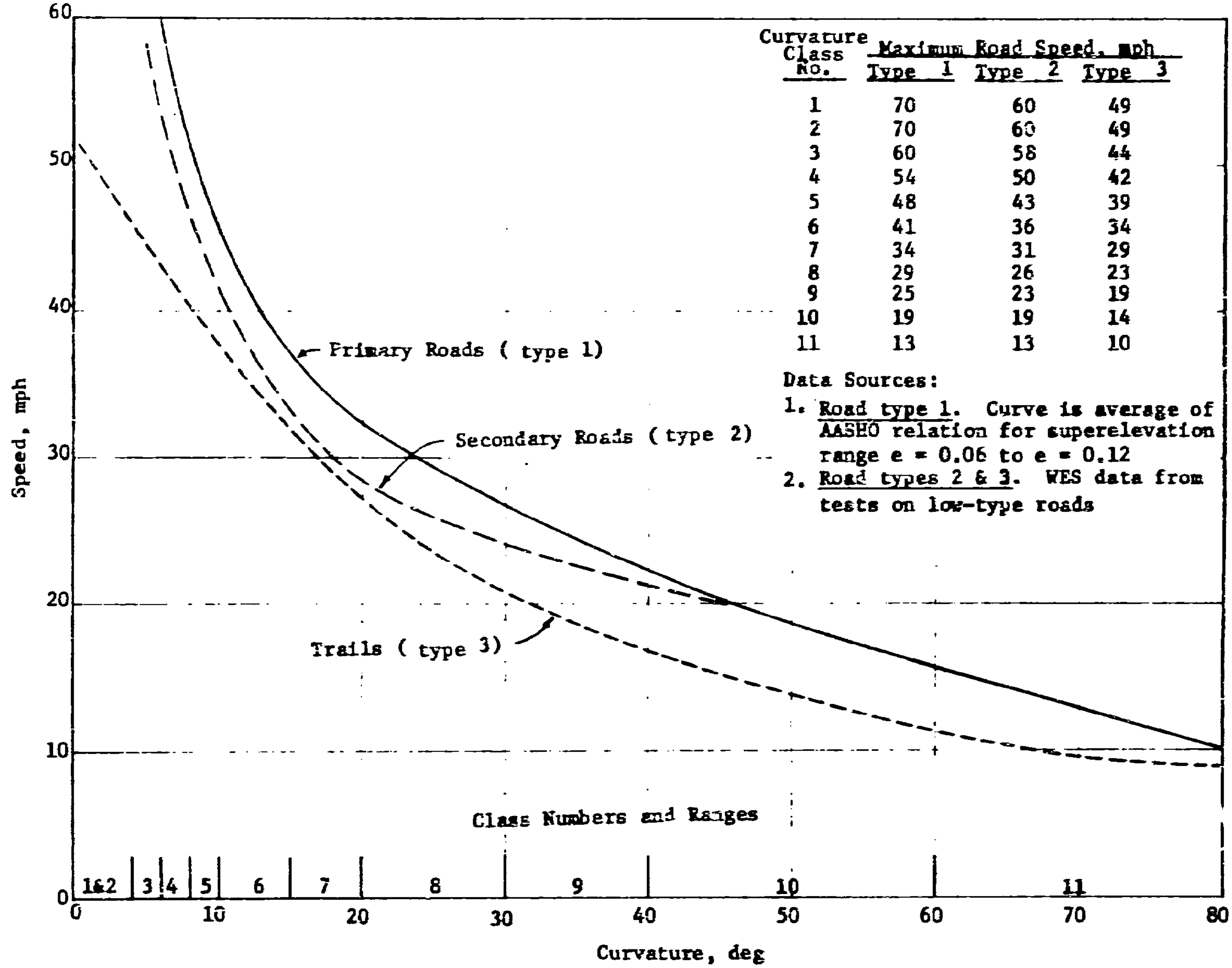


Fig. 4. Schematic flow diagram of on-road performance prediction model



Curvature Class No.	Maximum Road Speed, mph Type 1	Type 2	Type 3
1	70	60	49
2	70	60	49
3	60	58	44
4	54	50	42
5	48	43	39
6	41	36	34
7	34	31	29
8	29	26	23
9	25	23	19
10	19	19	14
11	13	13	10

Fig. 5. Speed versus curvature relation used in on-road curvature submodel

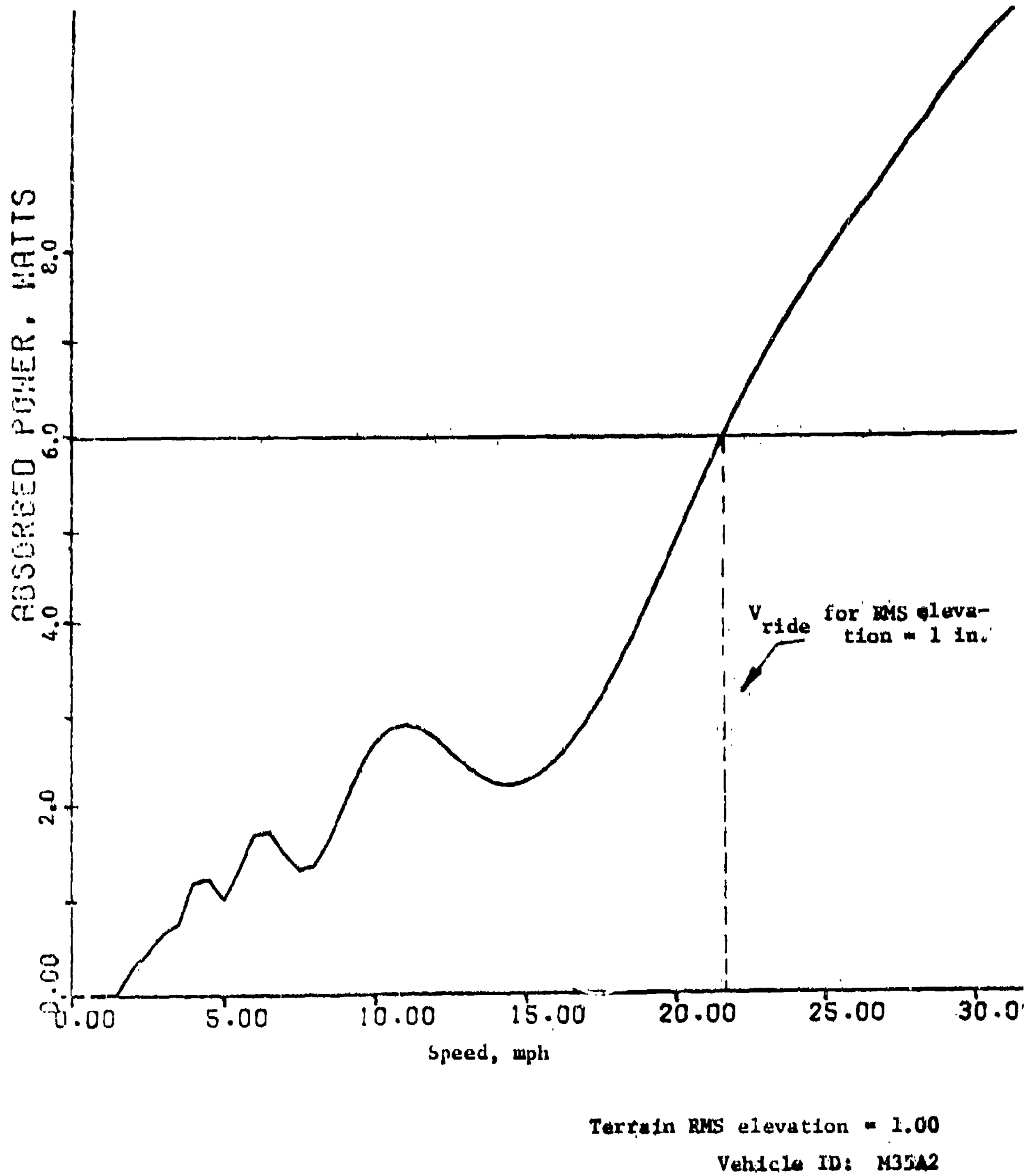


Fig. 6. Example of absorbed power versus speed relation (M35A2 2-1/2-ton, 6x6 cargo truck)

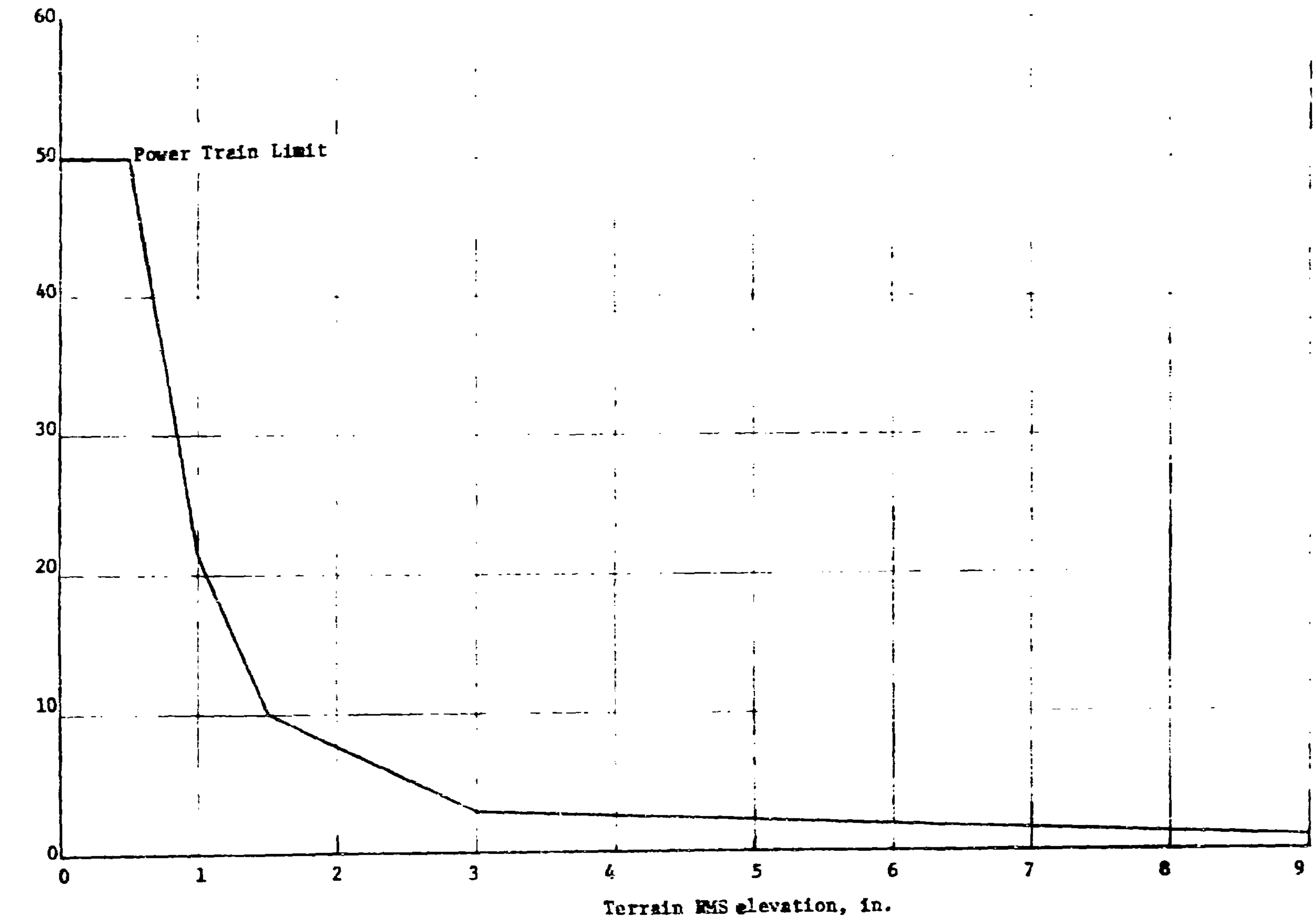


Fig. 7. Example of 6-watt speed versus terrain RMS relation (M35A2 2-1/2-ton, 6x6 cargo truck)

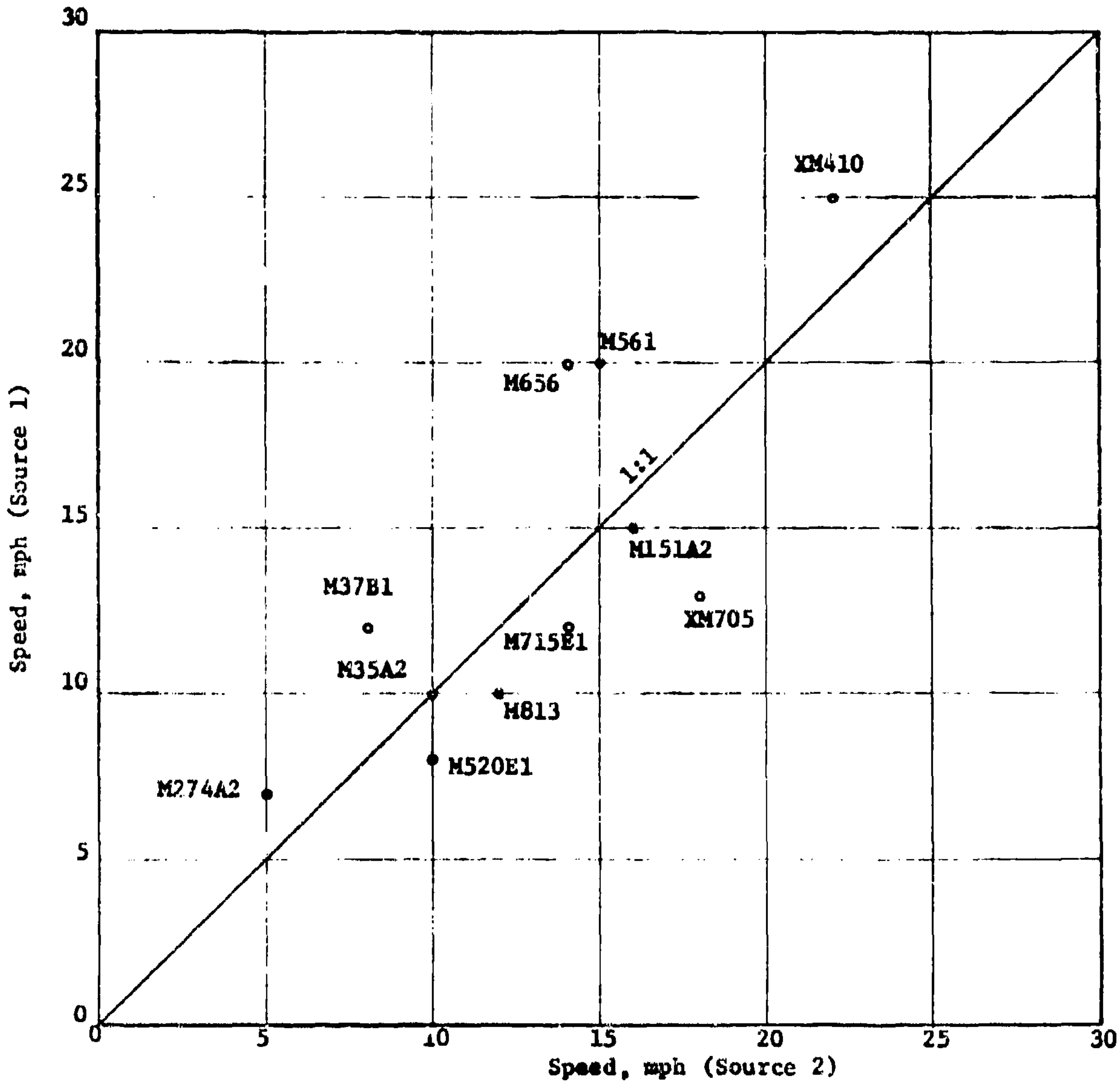


Fig. 8. Comparison of estimated ride-limited speed from two independent sources

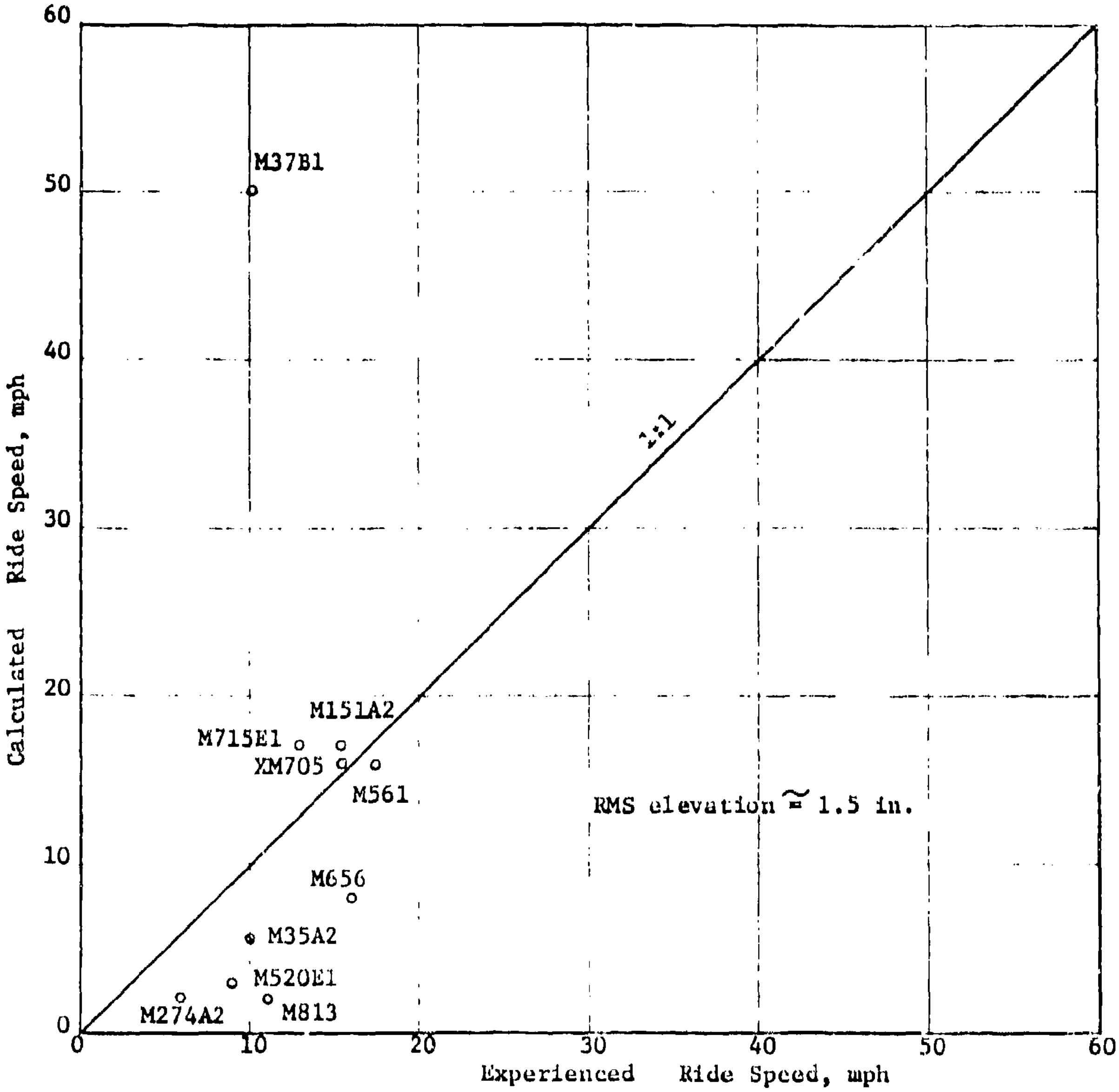


Fig. 9. Comparison of calculated and experienced ride values

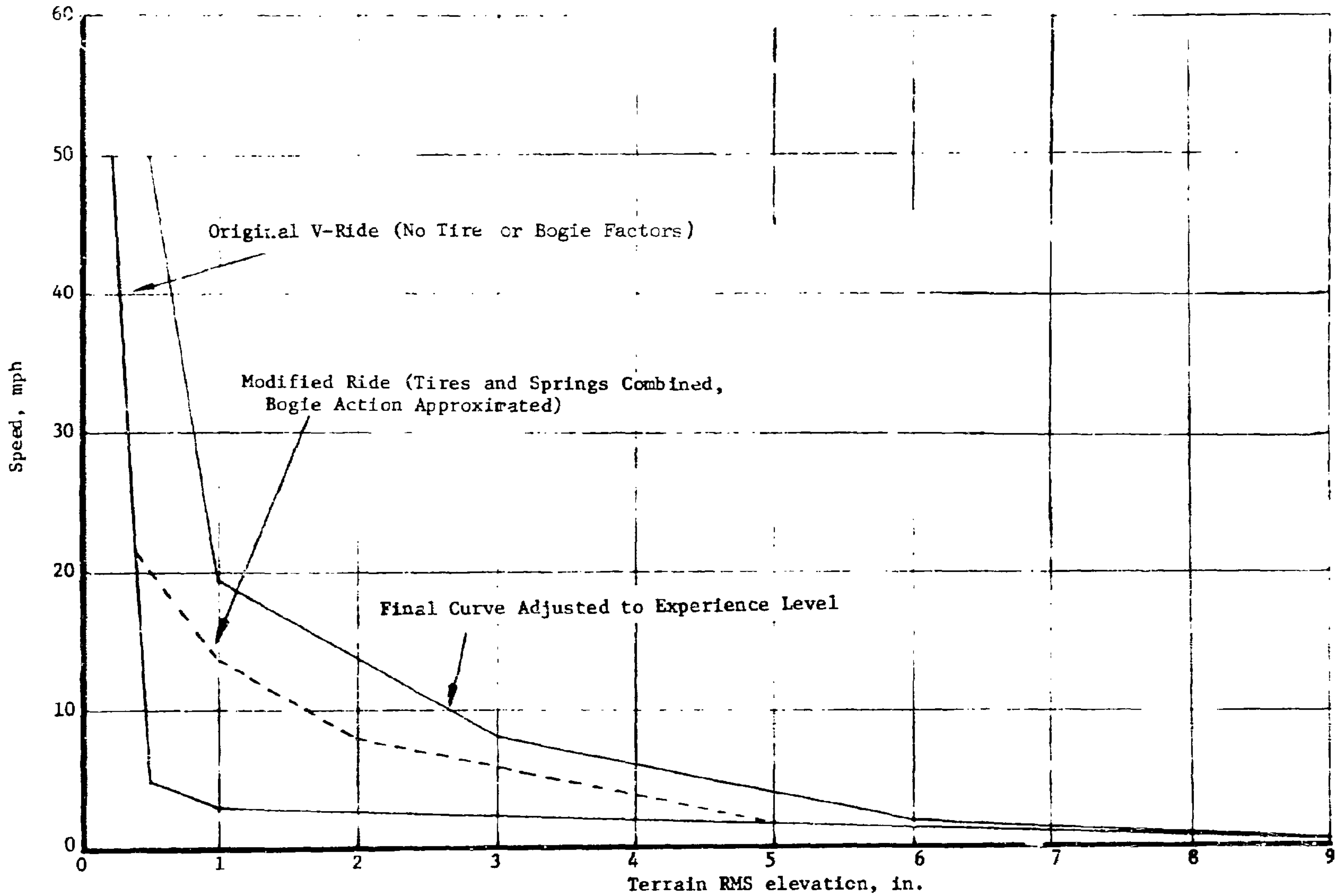


Fig. 10. Example of 6-watt ride-limited curve that required major adjustment (M656 5-ton, 8x8 cargo truck)

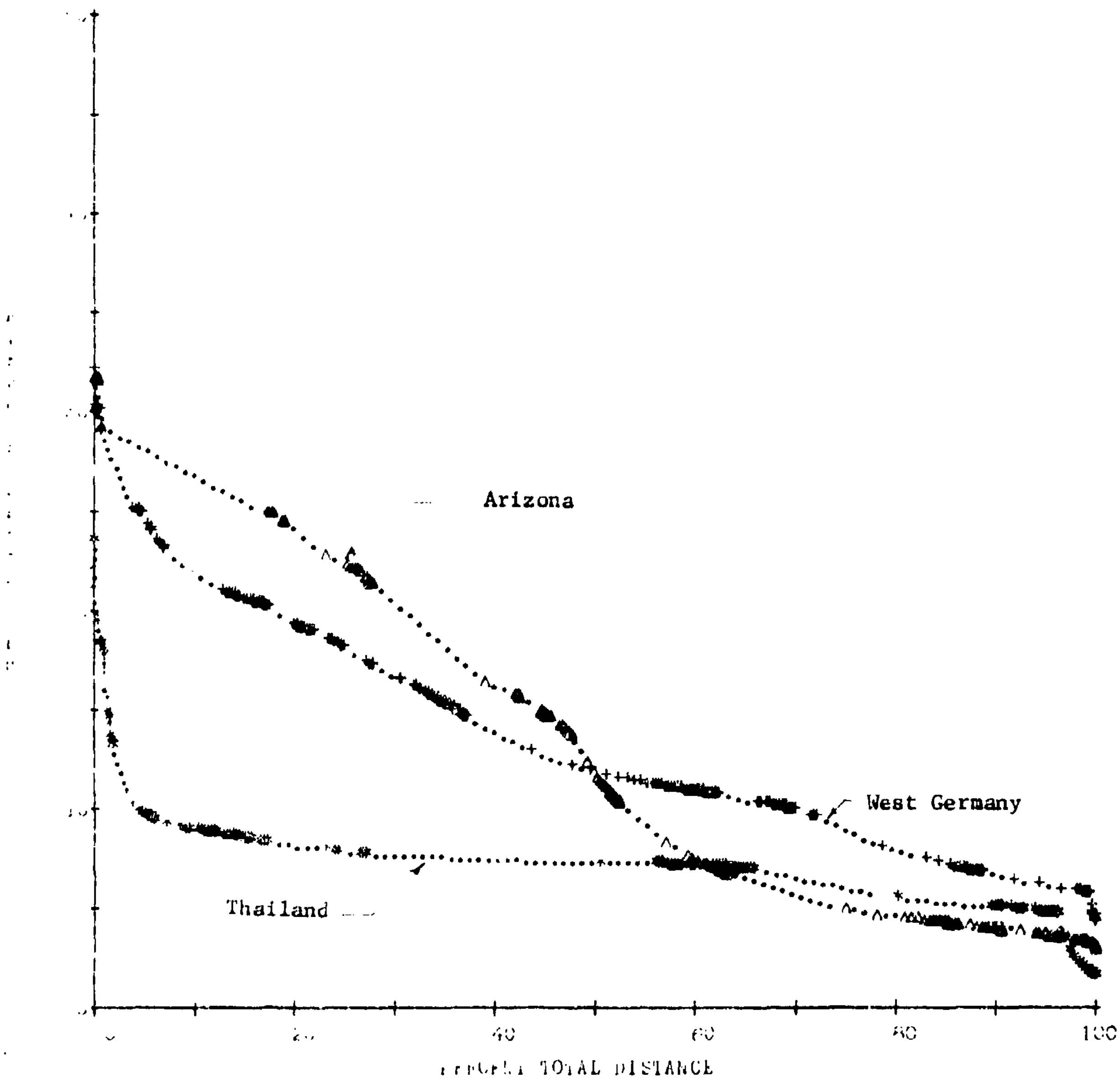


Fig. 11. Off-road speed versus percent traverse distance for M35A2 2-1/2-ton, 6x6 cargo truck

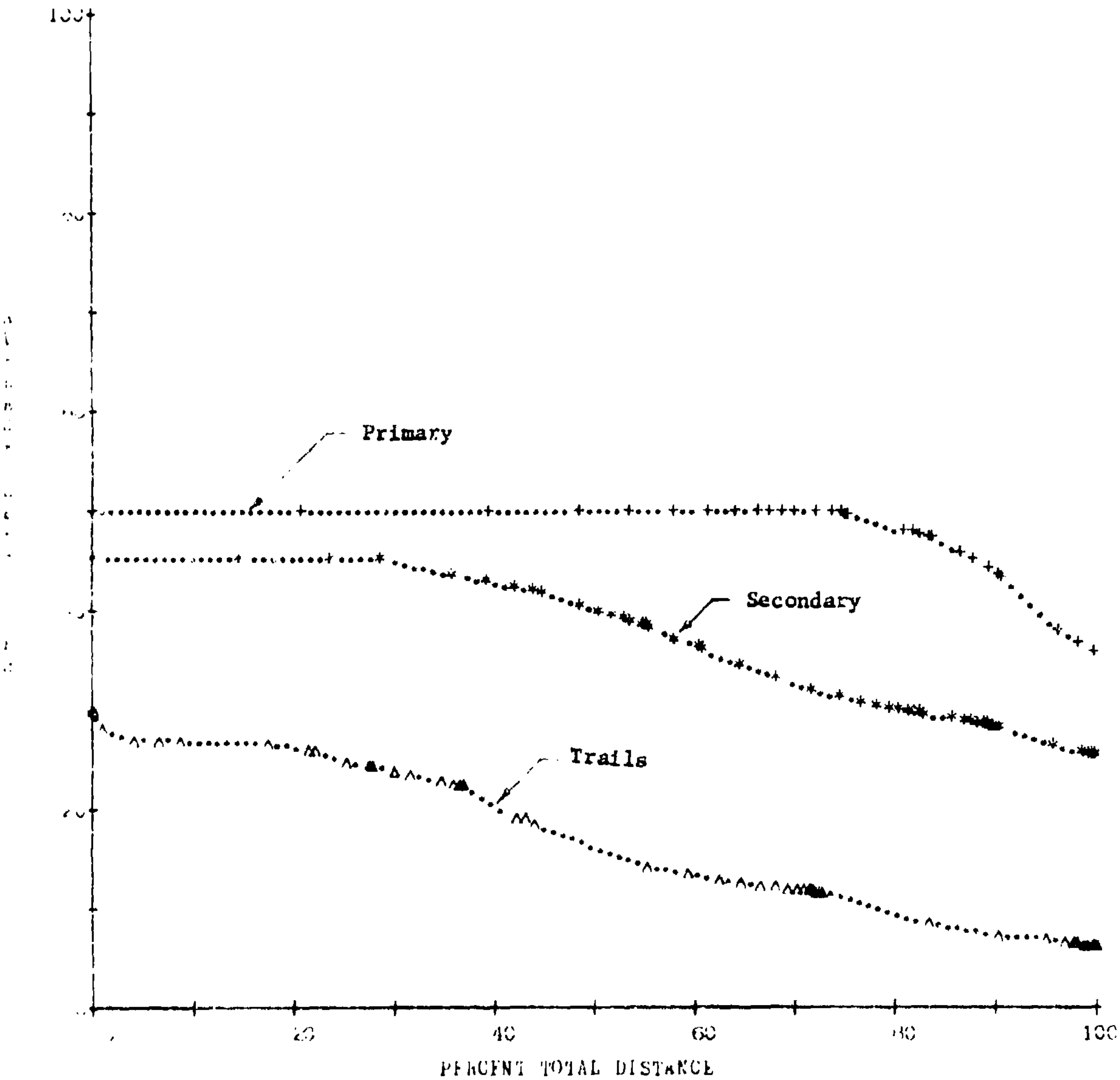


Fig. 12. On-road speed versus percent road distance for M35A2
2-1/2-ton, 6x6 cargo truck for West Germany

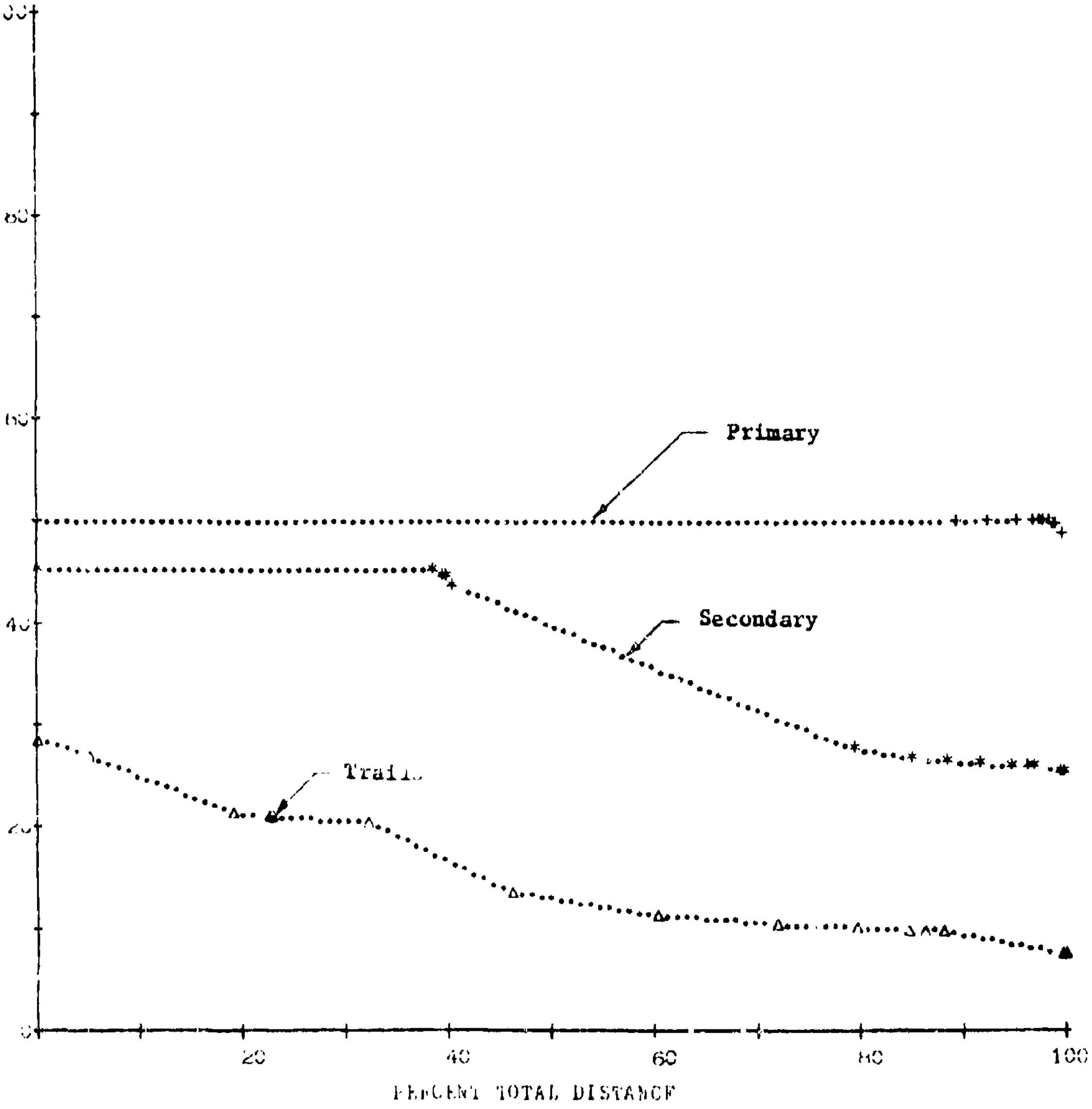


Fig. 13. On-road speed versus percent road distance for M35A2 2-1/2-ton, 6x6 cargo truck for Thailand

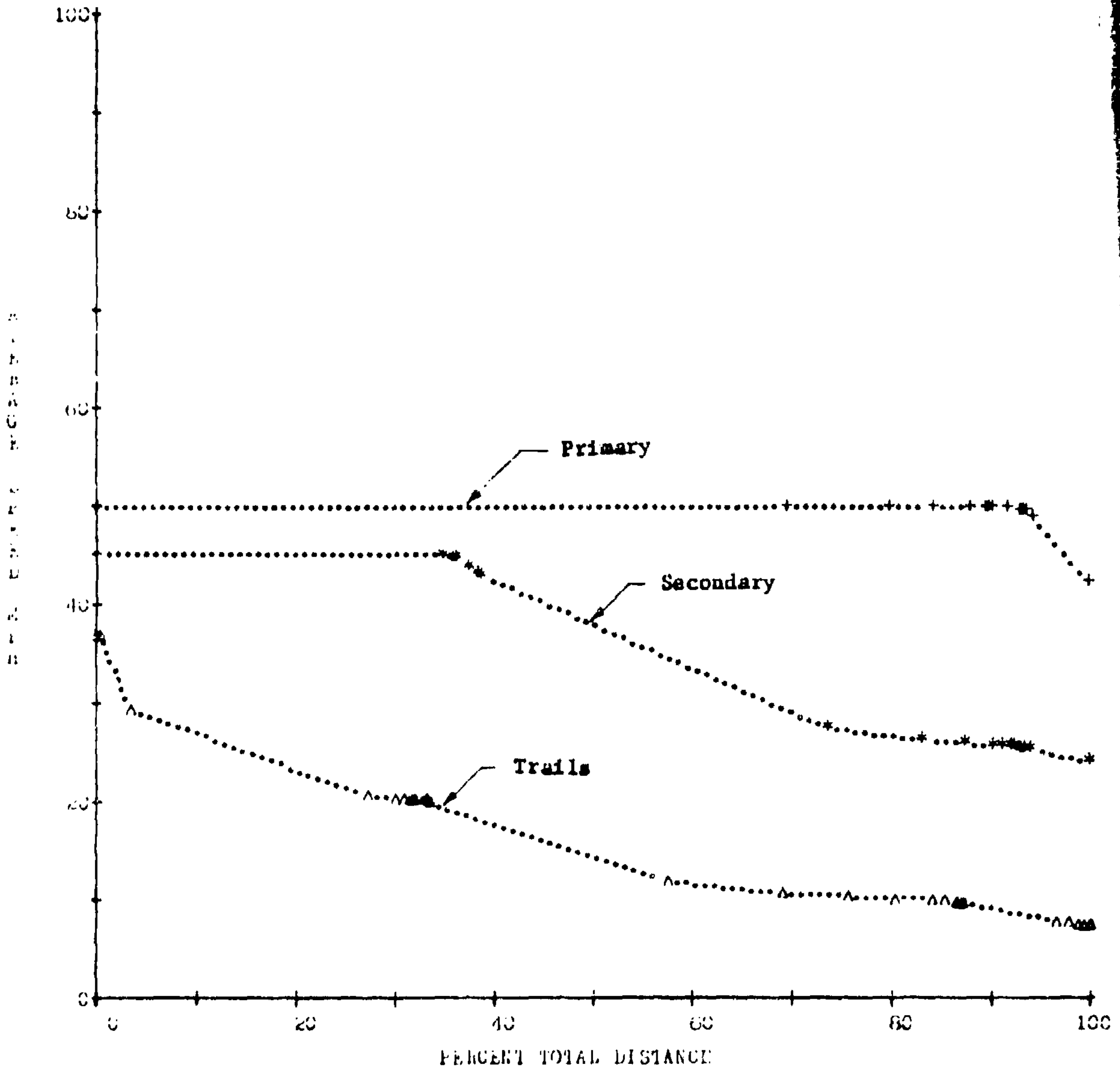


Fig. 14. On-road speed versus percent road distance for M35A2 2-1/2-ton, 6x6 cargo truck for Arizona

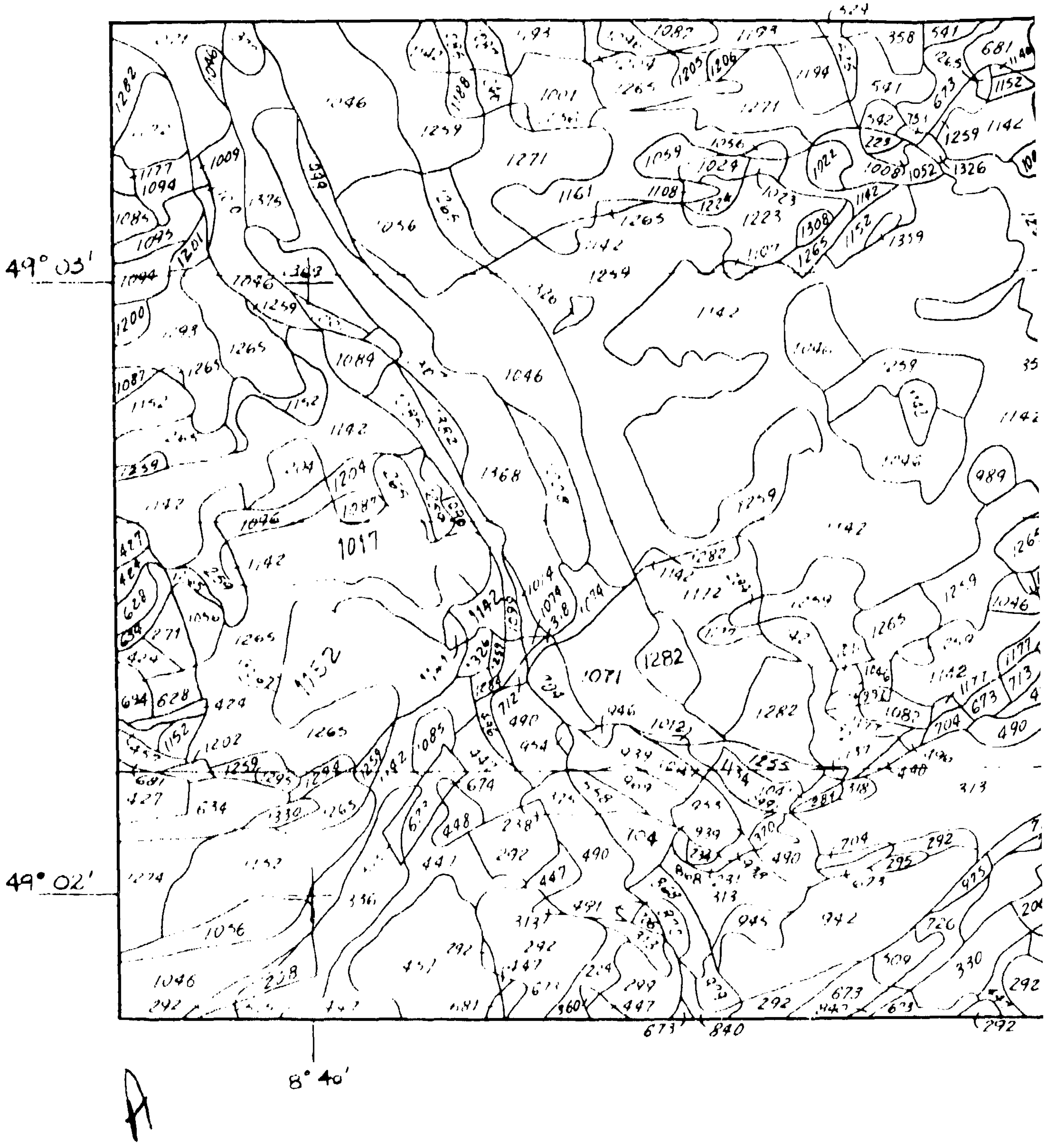
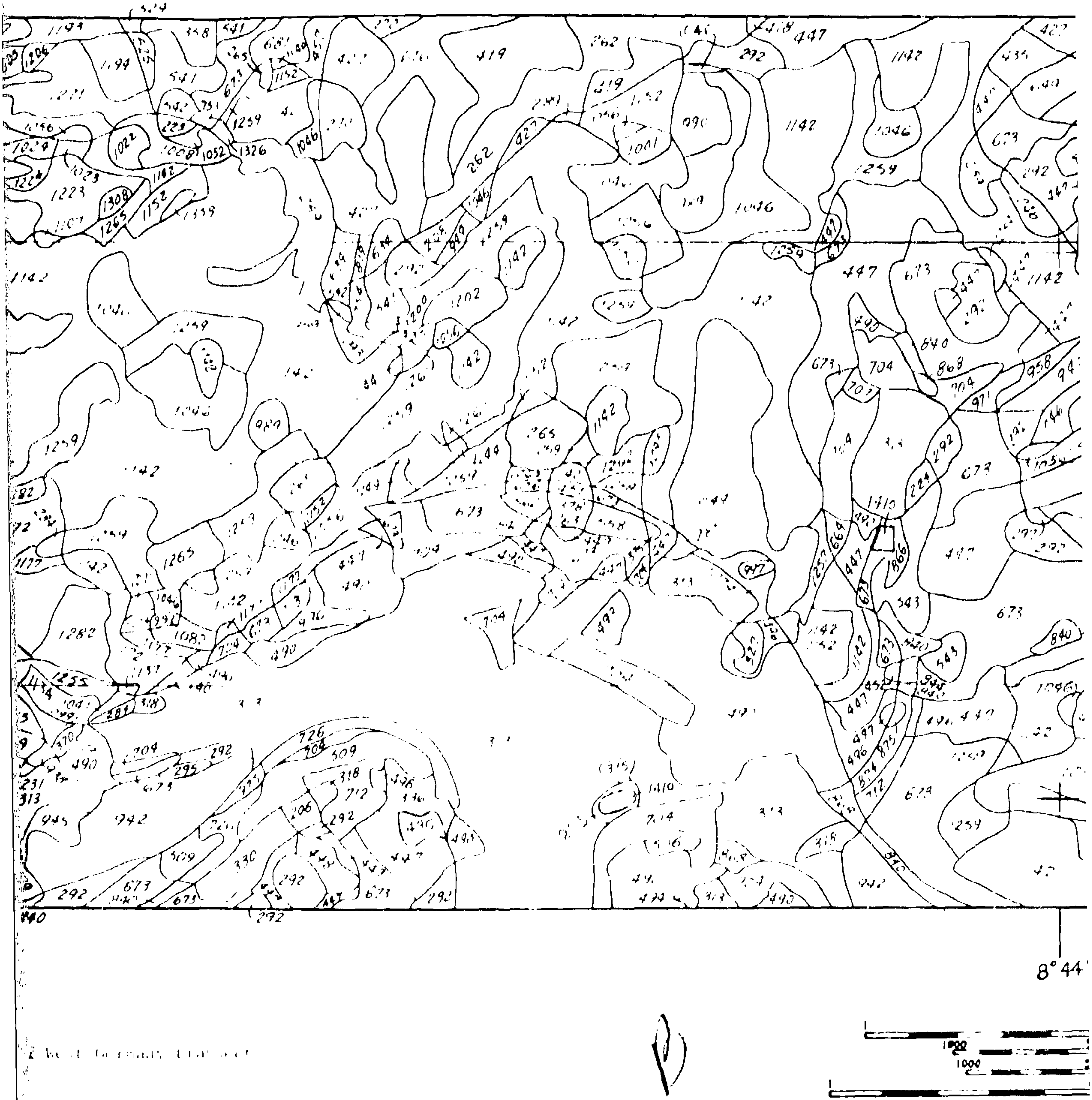
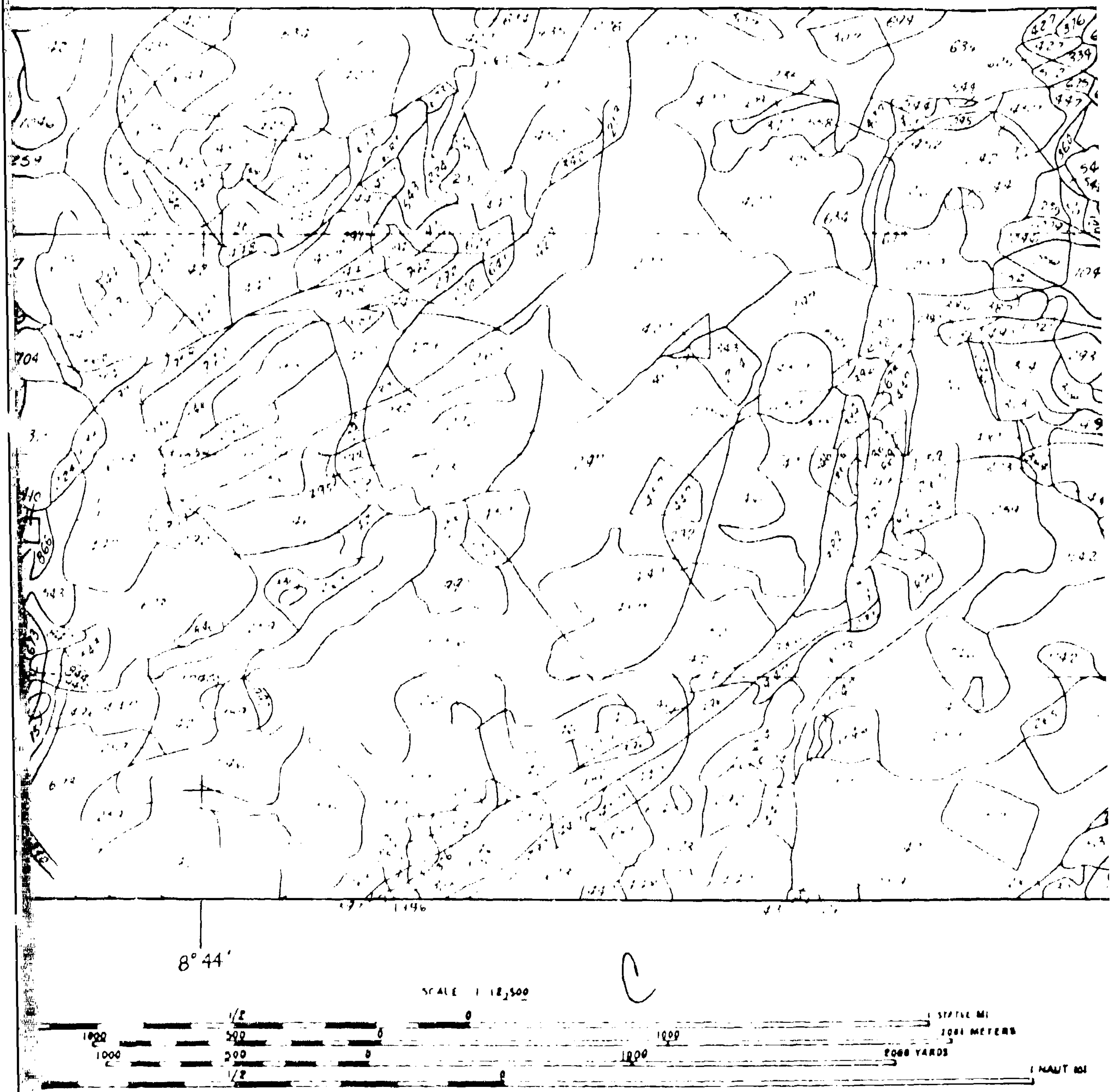


Fig. 15. Areal terrain unit map of eastern section of West Germany transect



8° 44'
1000
1000


8° 44'
C
SCALE 1:12,500
STATUTE MI
METERS
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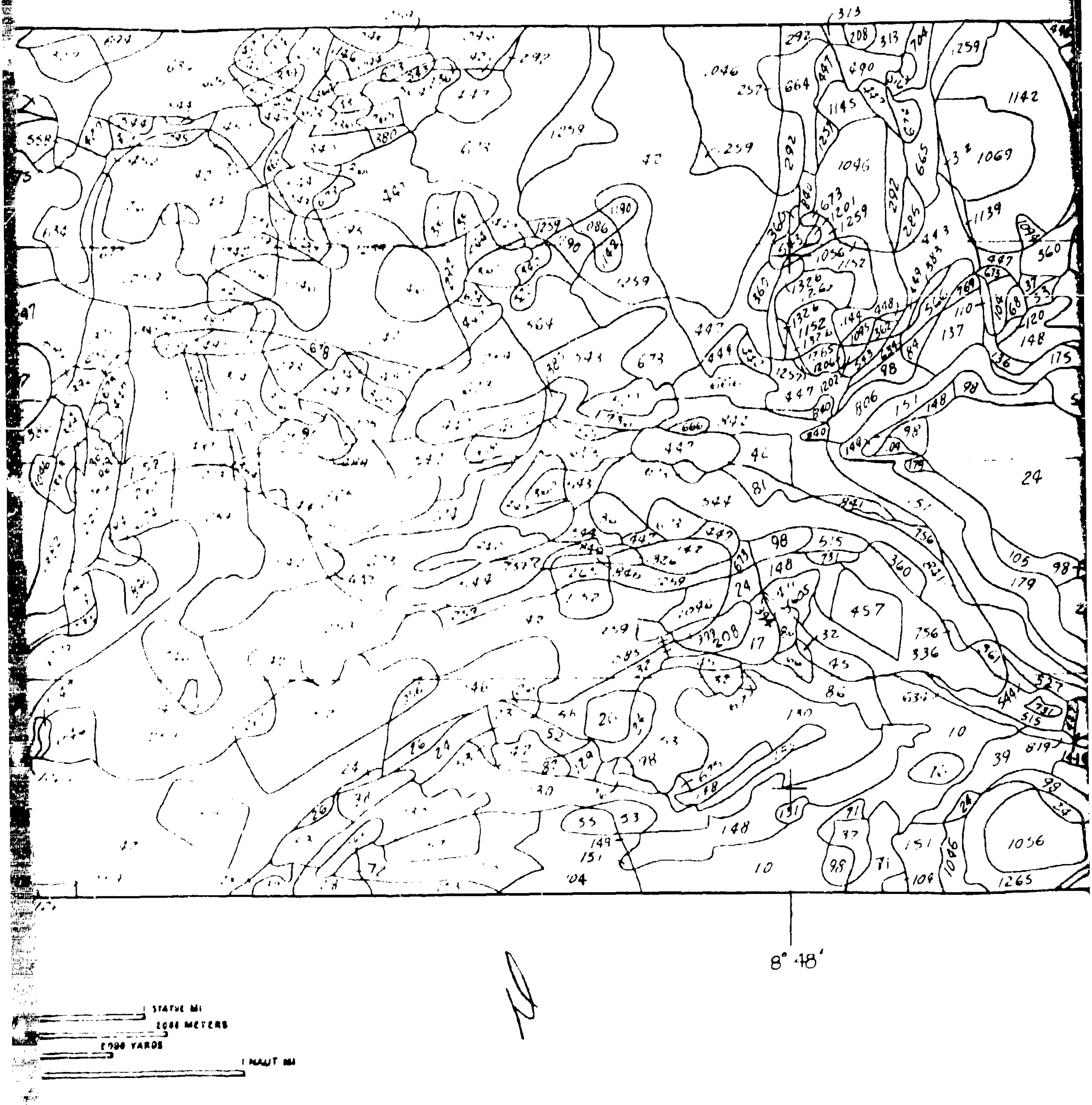
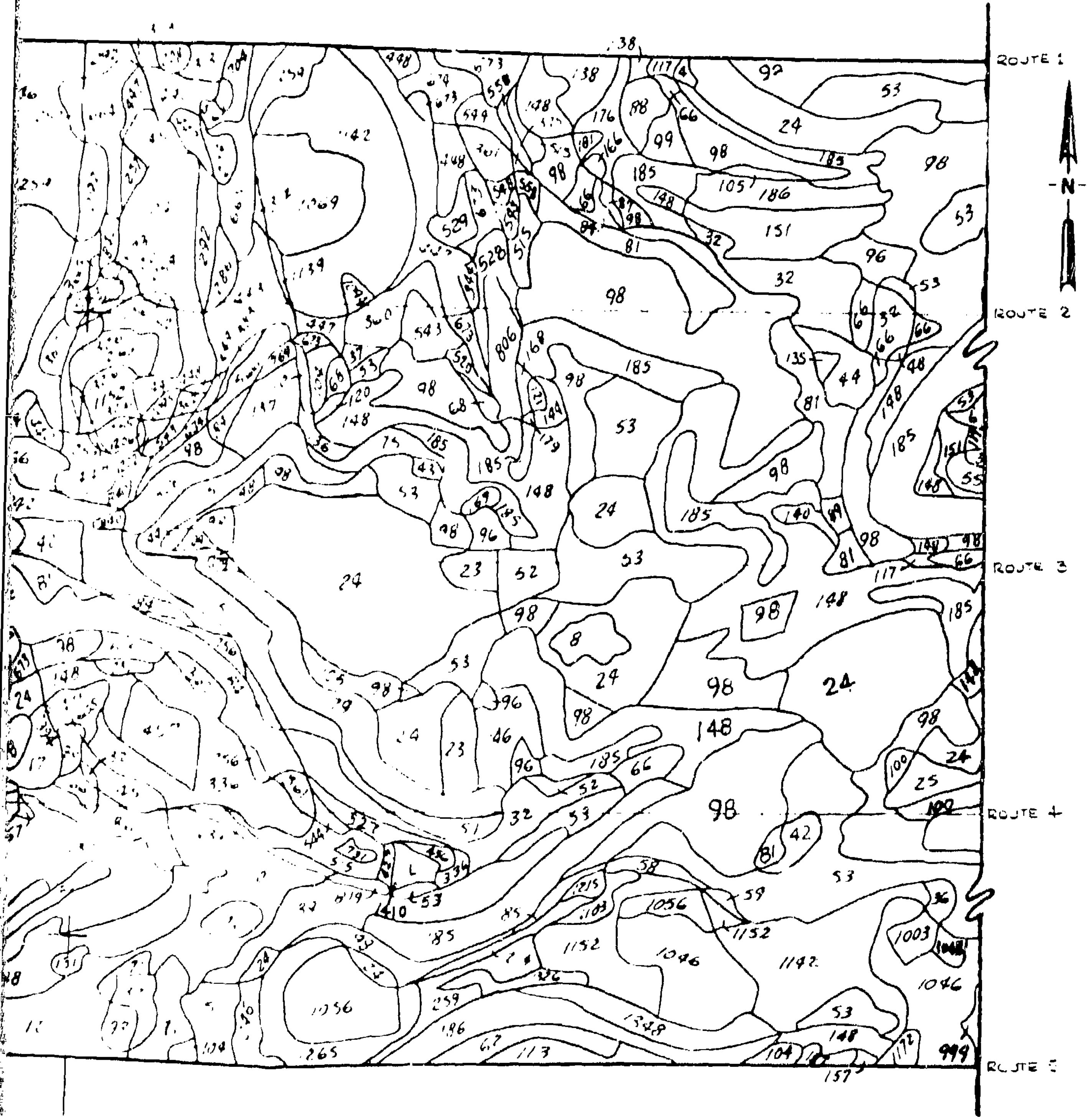
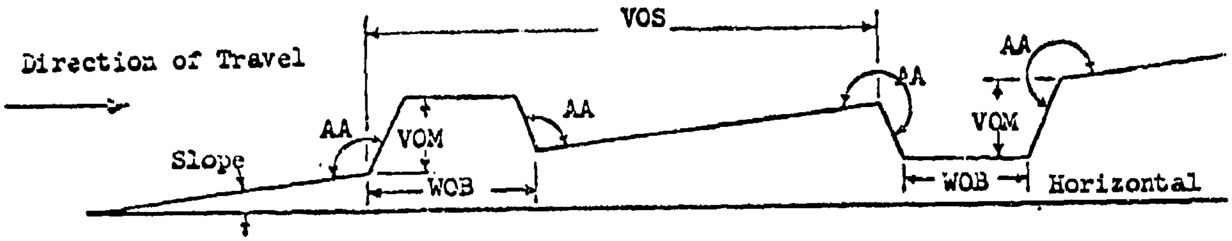

8° 48′
1 STATUTE MI
2000 METERS
2000 YARDS
1 NAUT MI

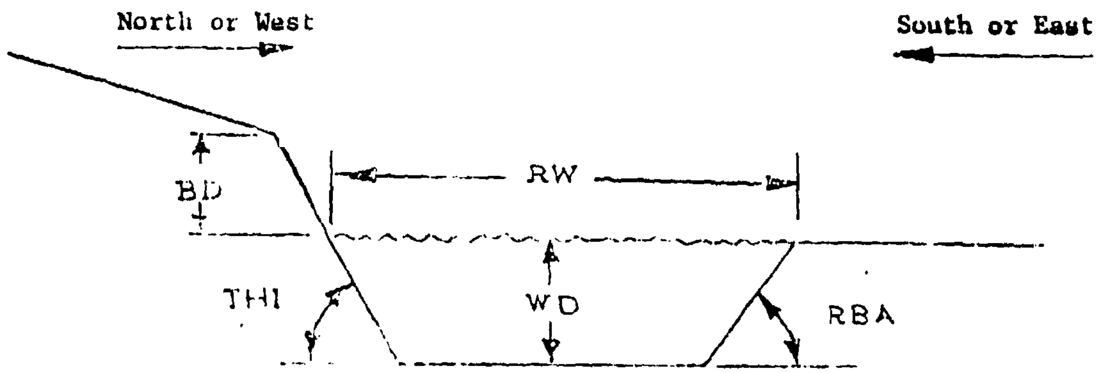


8° 48'



1. Obstacle approach angles (AA). The angle formed by the inclines at the base of a positive or top of a negative vertical obstacle that a vehicle must sense in surmounting the obstacle.
2. Obstacle base width (WOB). The distance across the bottom of the obstacle.
3. Obstacle spacing (VOS). The horizontal distance between contact edges of vertical obstacles
4. Obstacle vertical magnitude (VOM). The vertical distance from the base of a vertical obstacle to the crest of the obstacle.
5. Obstacle length (VOL). The length of the long axis of the obstacle.

Fig. 16. Definition of obstacle geometry terms



1. Differential Bank Height (BD) - The difference in elevation of the two banks.

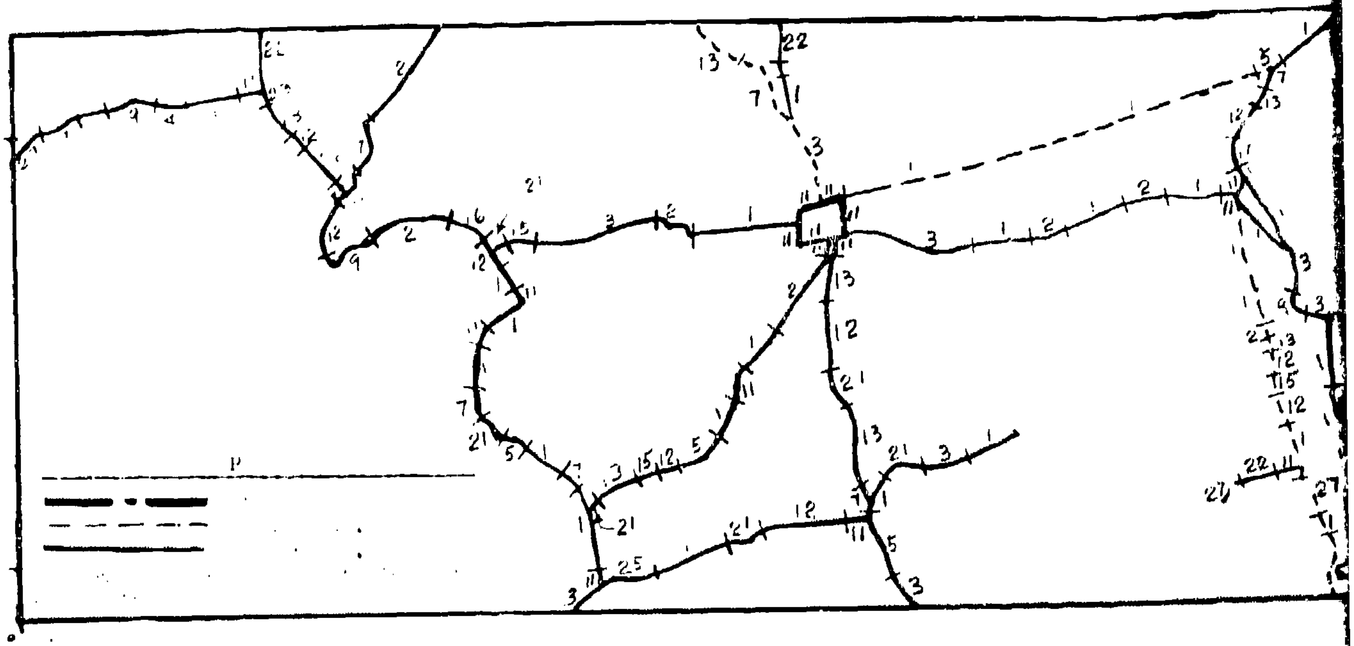
2. Gap Side Slope (THI, RBA) - The angle formed by the bounding incline at the top of the hydrologic feature. The angle is measured with respect to the horizontal.

3. Water Depth (WD) - Maximum depth of water in channel.

4. Water Width (RW) - The width of the stream at water level

5. Water Velocity (WS) - The maximum velocity of water in a channel.

Fig. 17. Hydrologic geometry terms



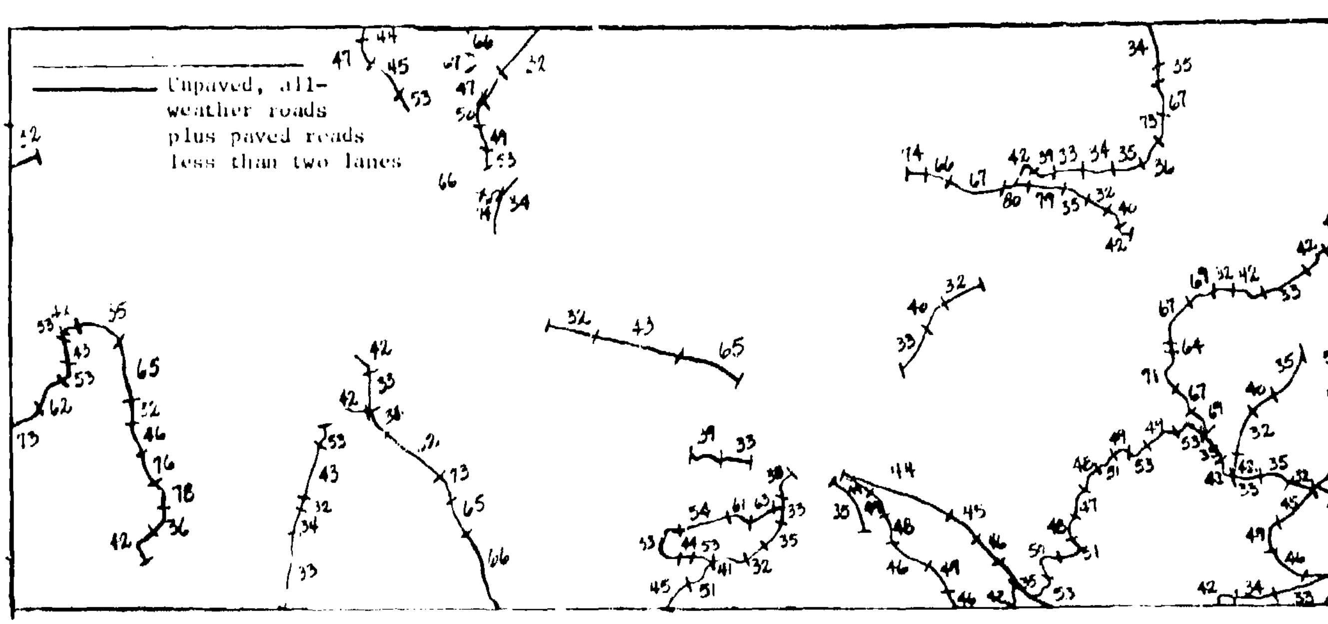
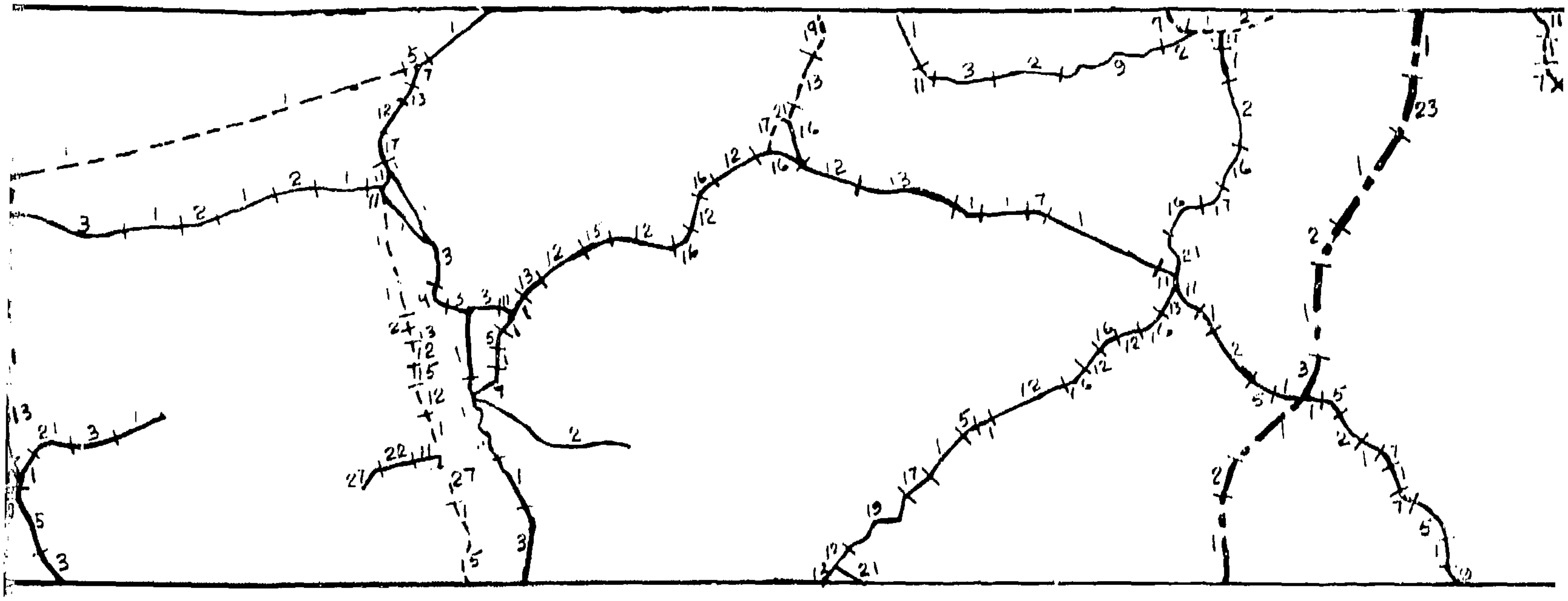
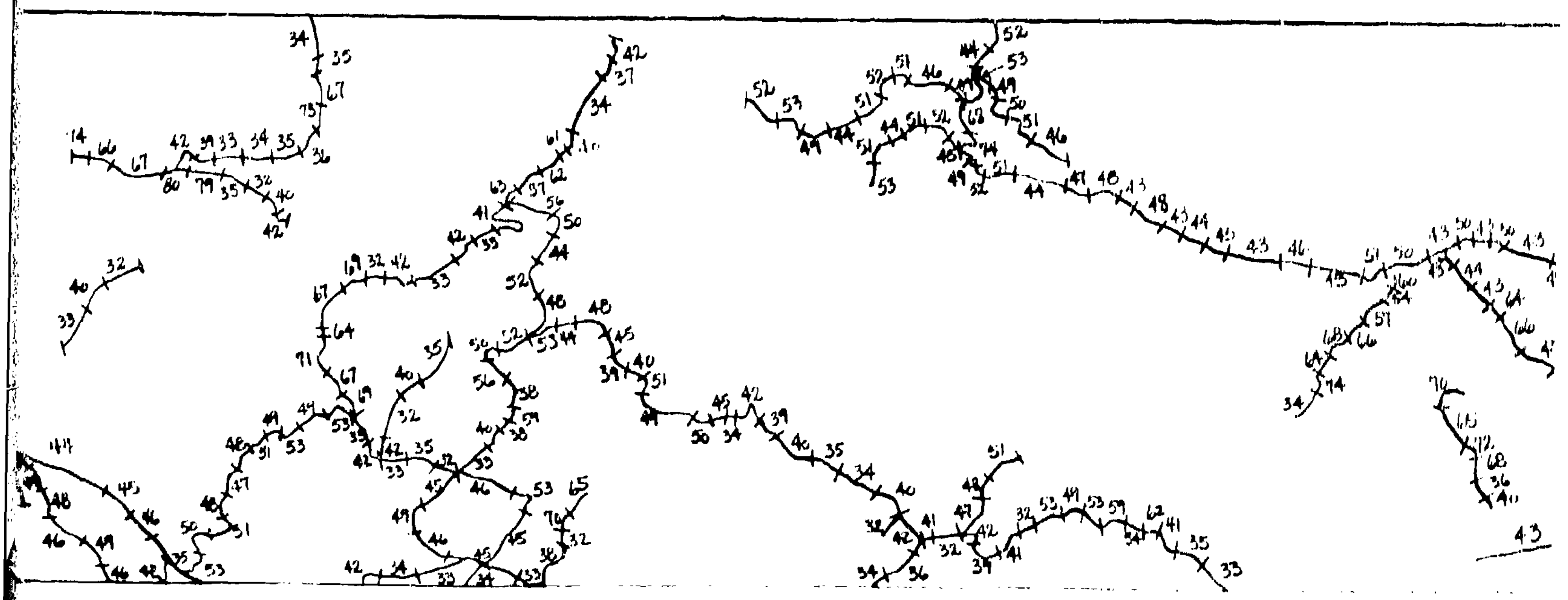


Fig. 18. West Germ

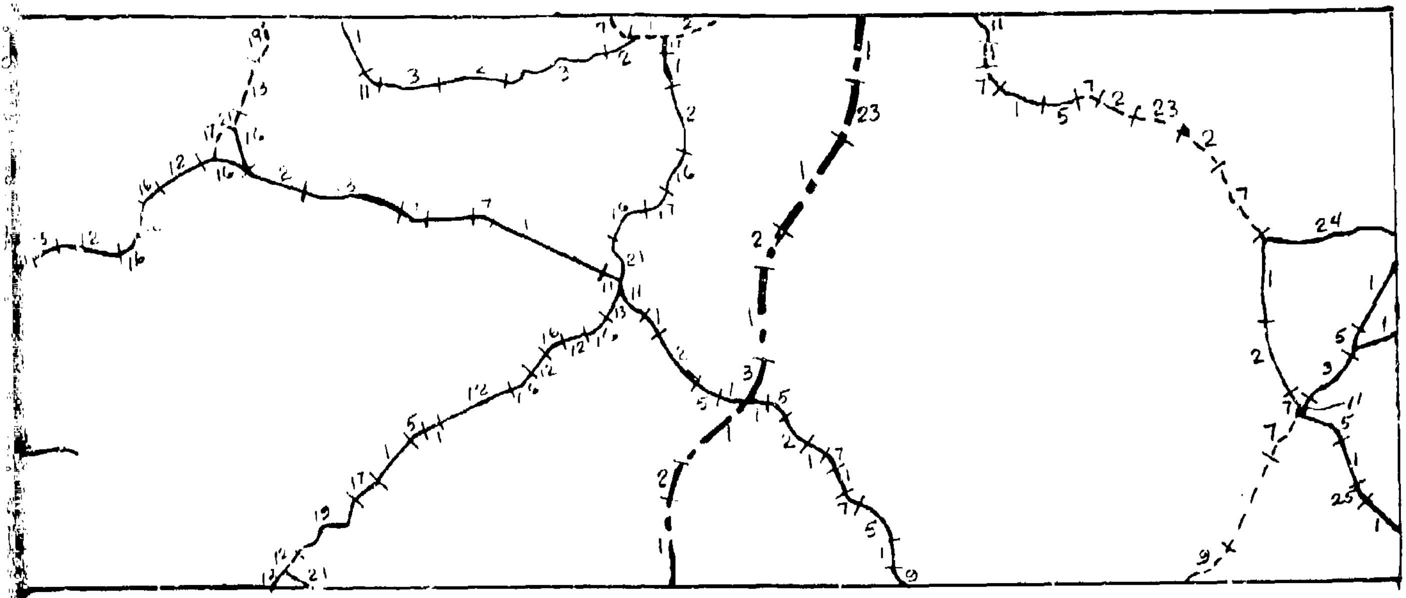


a. Primary roads - type 1

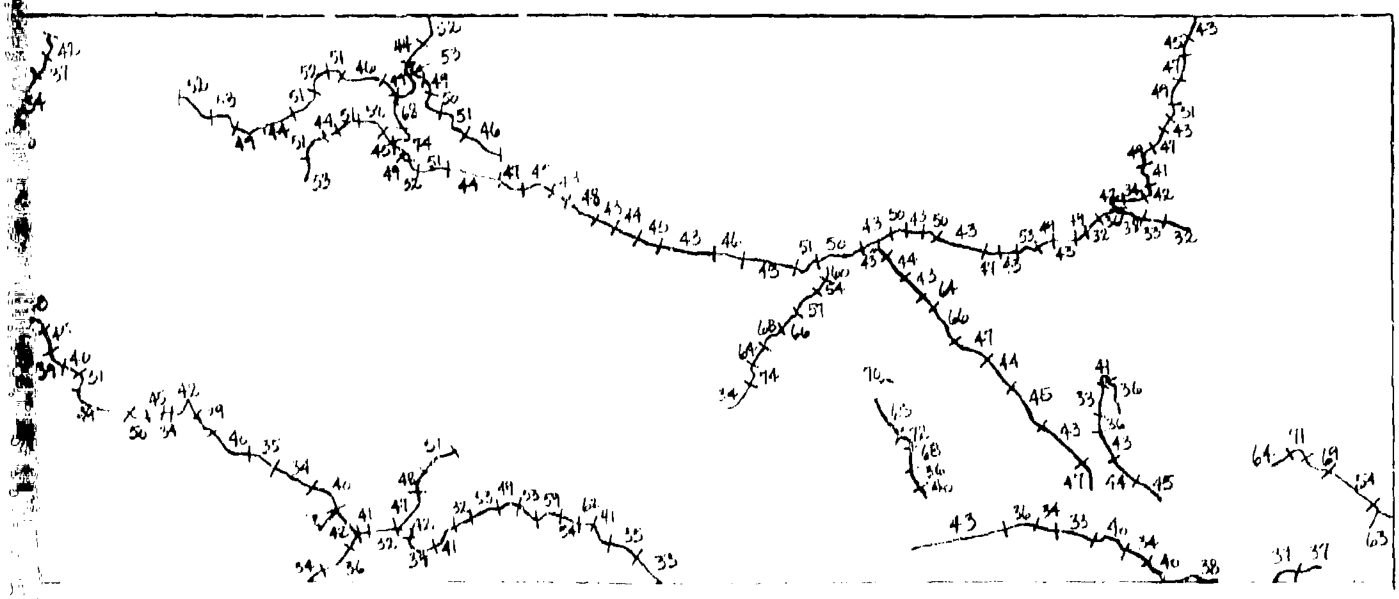


b. Secondary roads - type 2

Fig. 18. West Germany road unit maps for primary and secondary roads

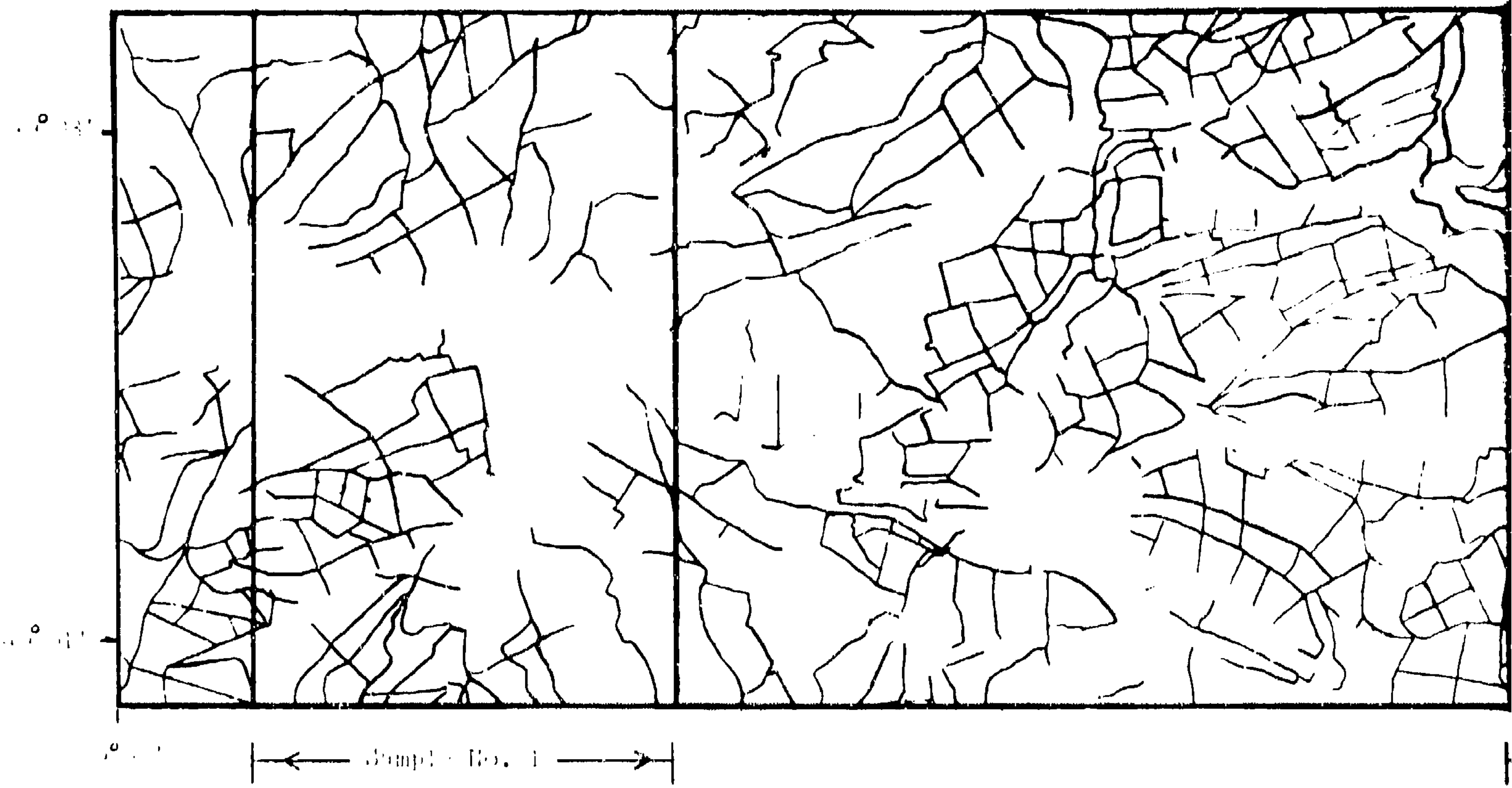


imary roads -- type 1



dary roads -- type 2

ail maps for primary and secondary roads


Sample No. 1

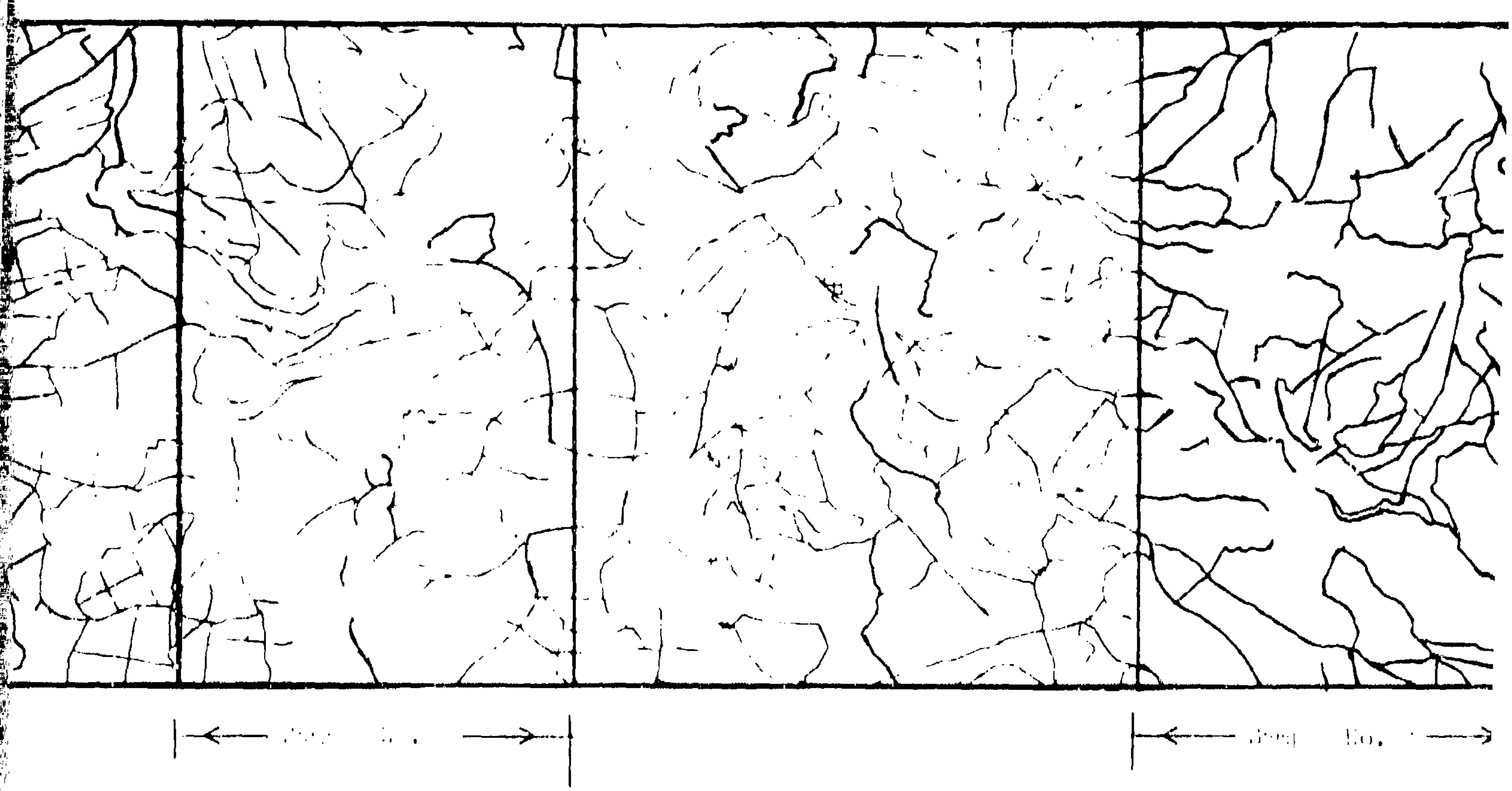
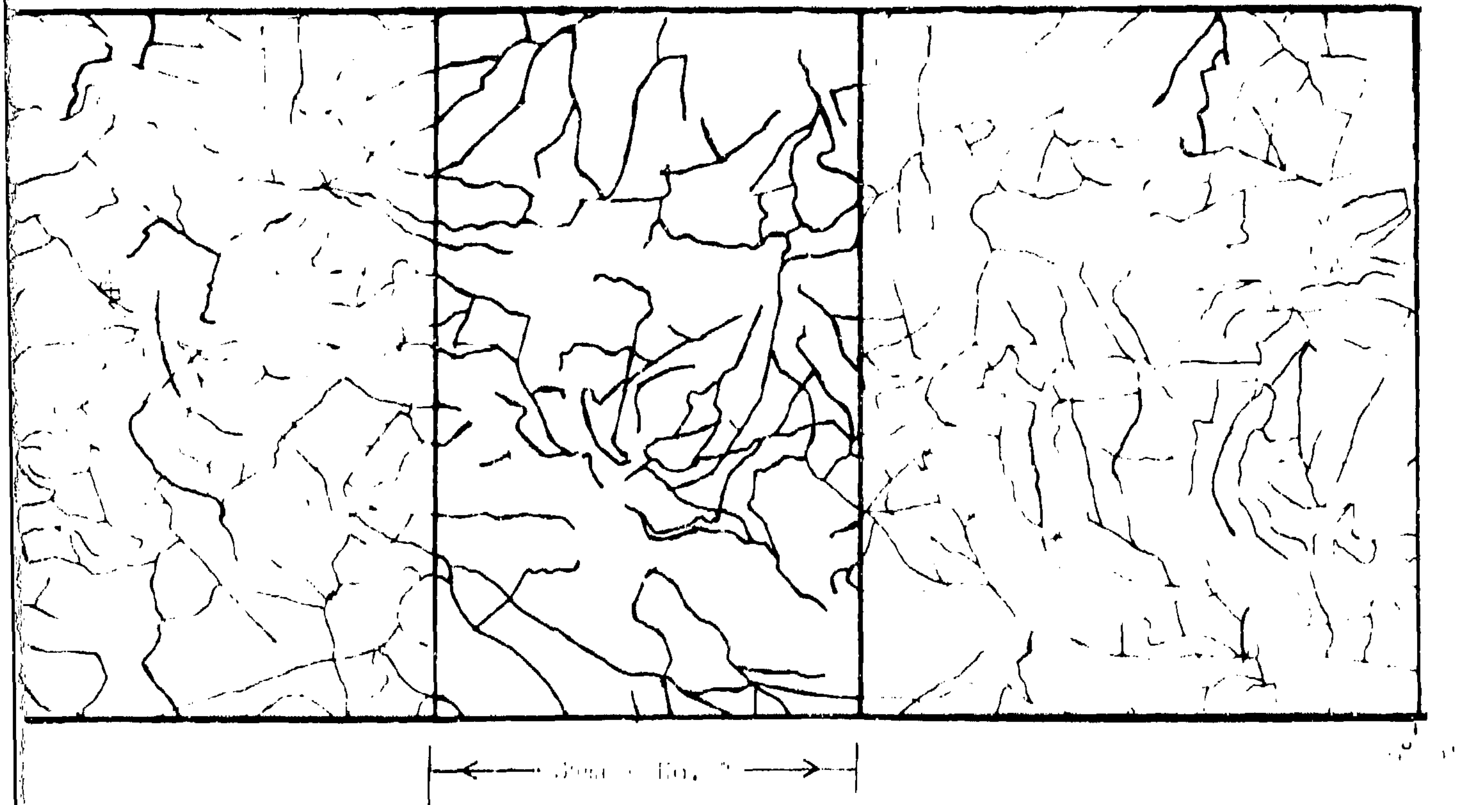


Fig. 19. Trail roads (fair-weather roads) - type 3, and location of areas used for sampling



ado) - type 3, and location of
sampling

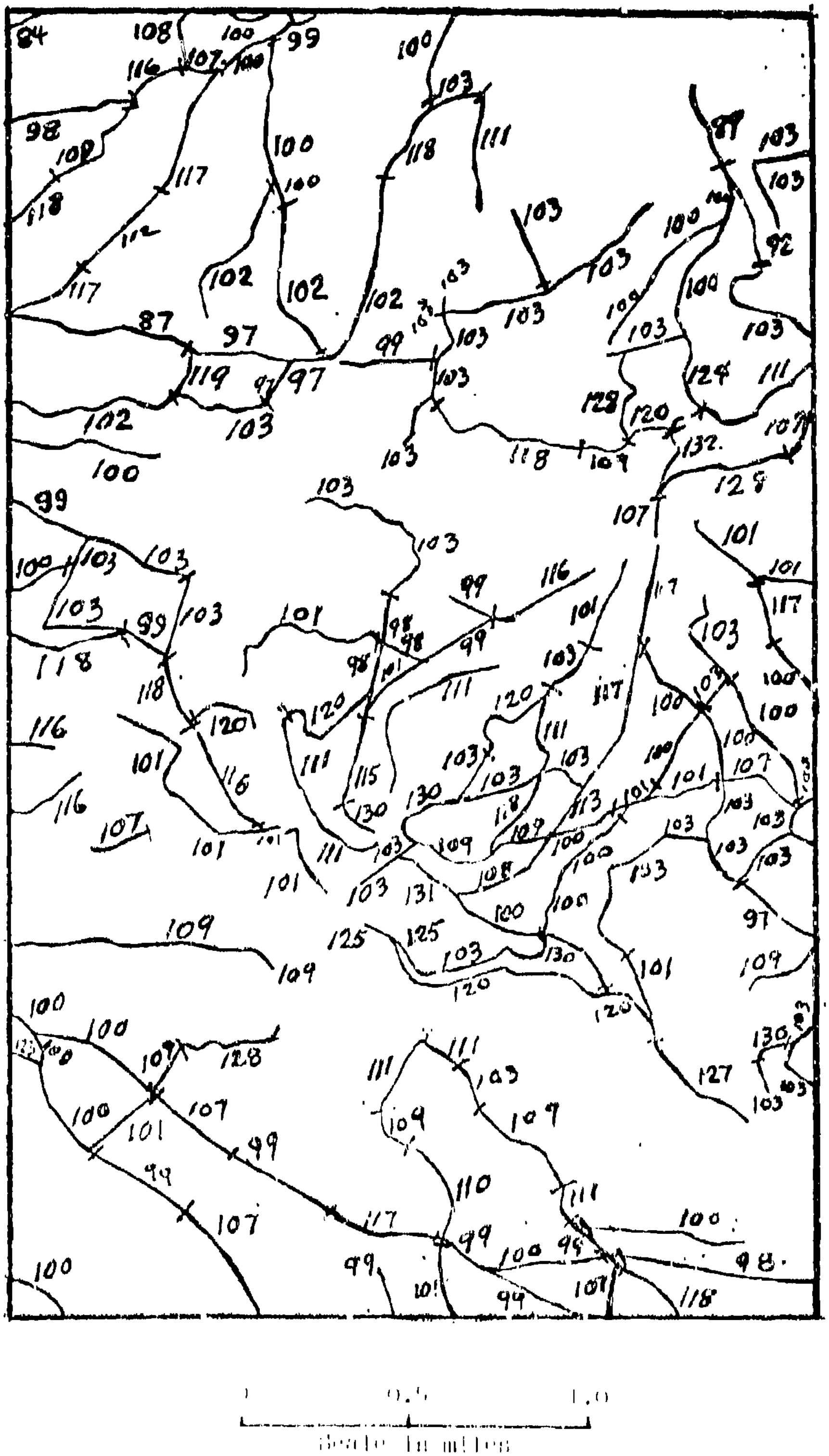


Fig. 20. Sample No. 3 of West Germany road unit map for type 3 trail roads

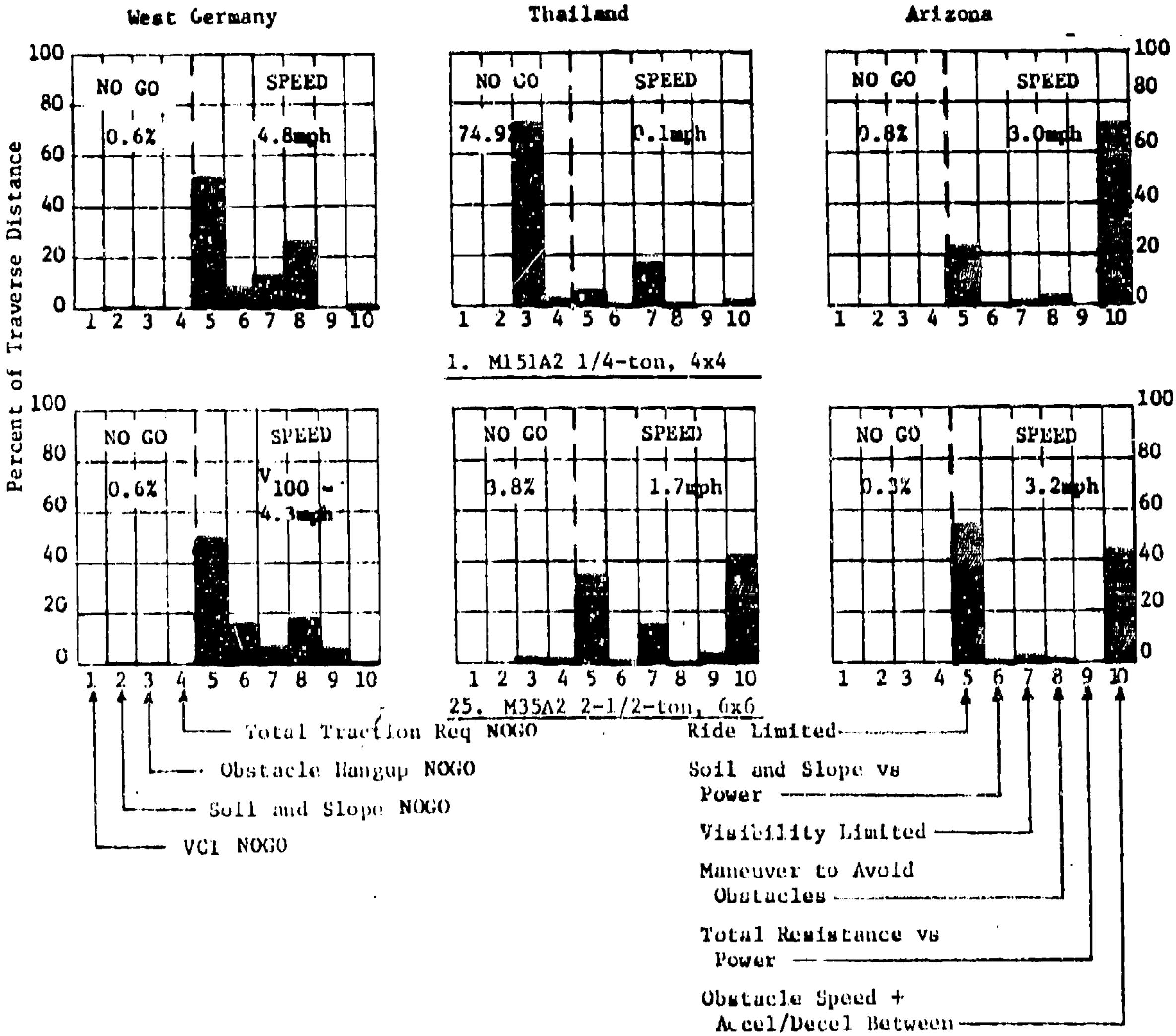
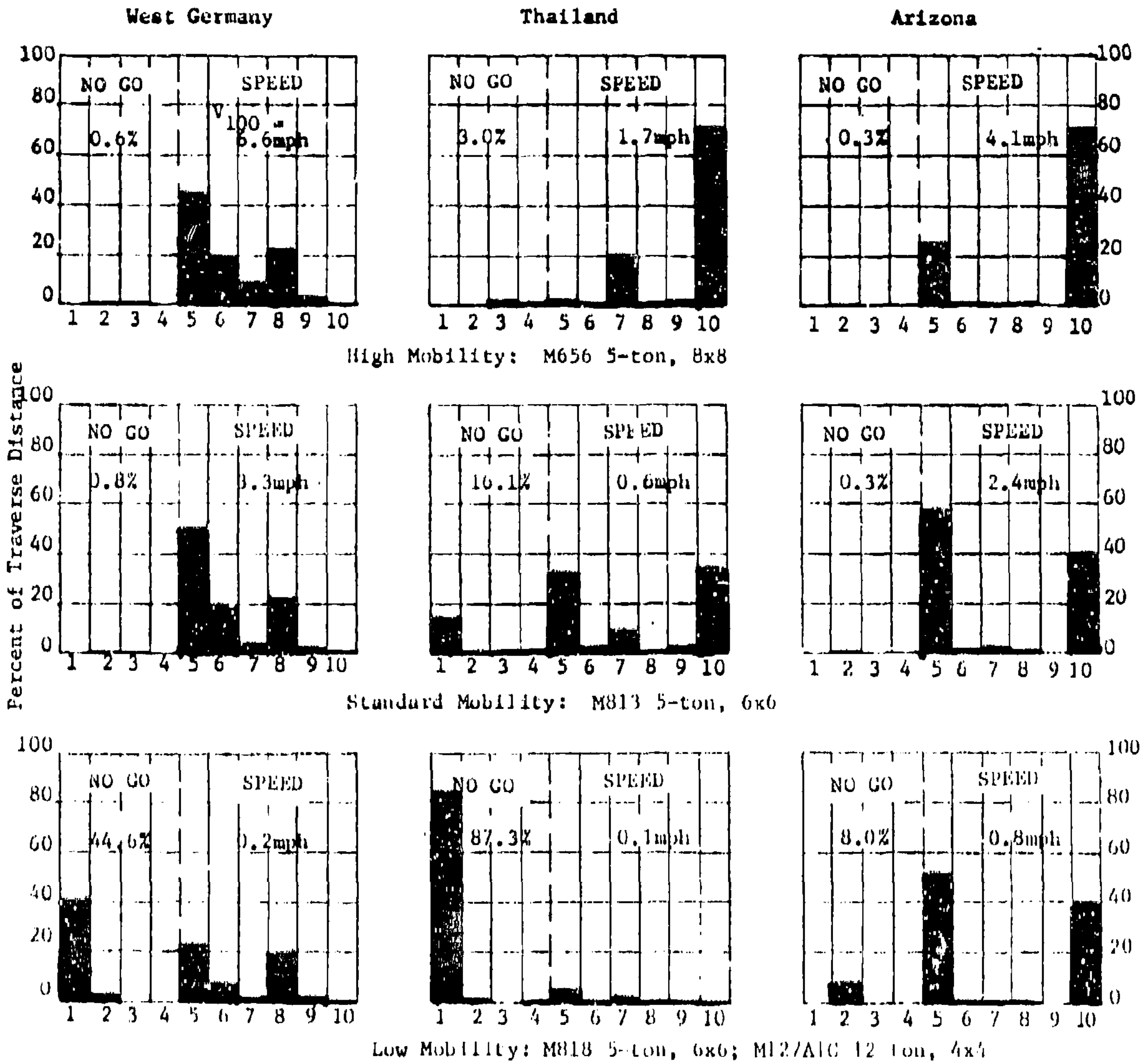


Fig. 21. Factors controlling speed (M151A2 1/4-ton, 4x4 and M35A2 2-1/2 ton, 6x6 trucks)



Note: Refer to fig. 21 for legend of factors controlling speed

Fig. 22. Factors controlling speed (standard 5-ton payload vehicles)

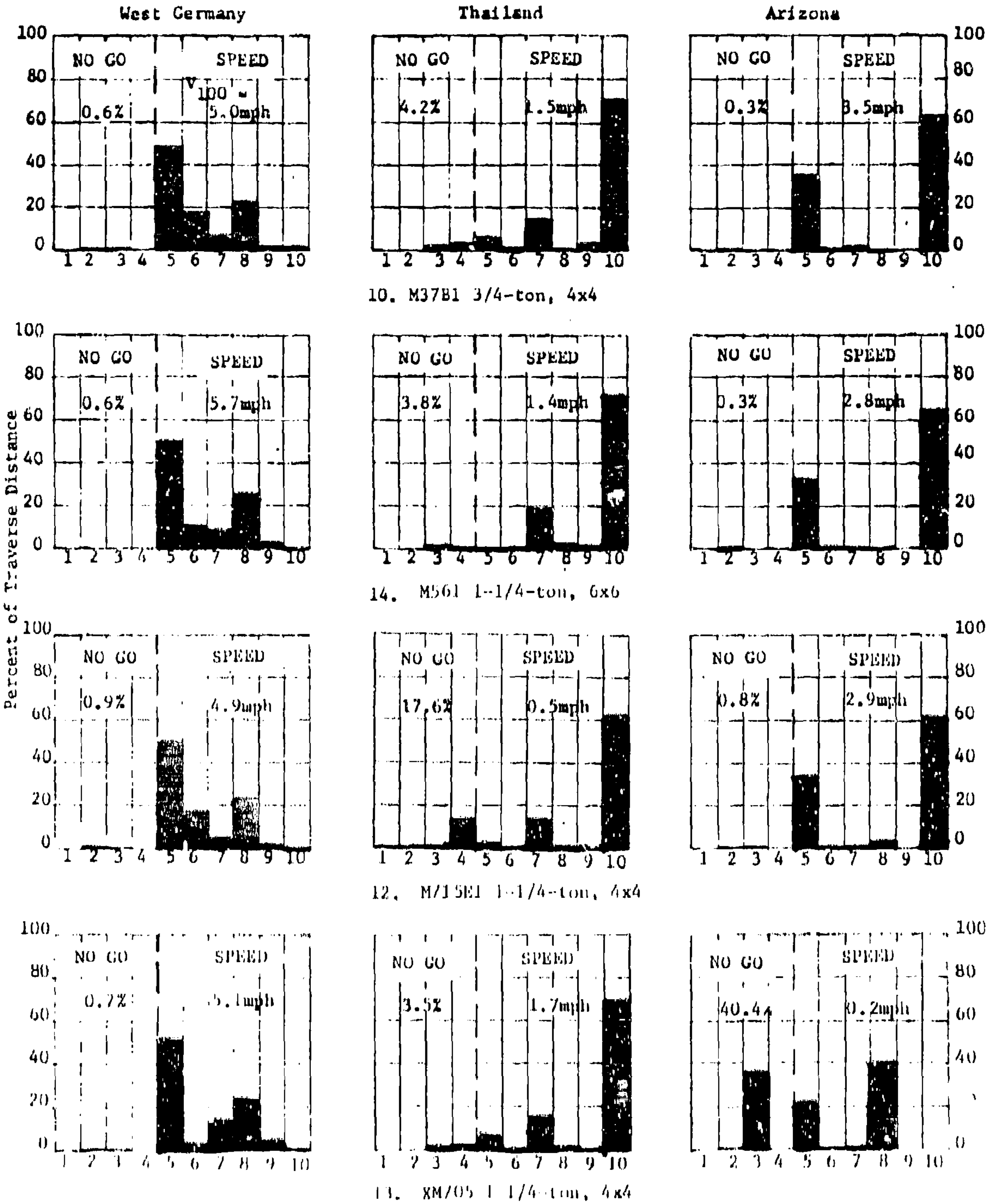


Fig. 23. Factors controlling speed (3/4-ton and 1-1/4-ton standard vehicles)

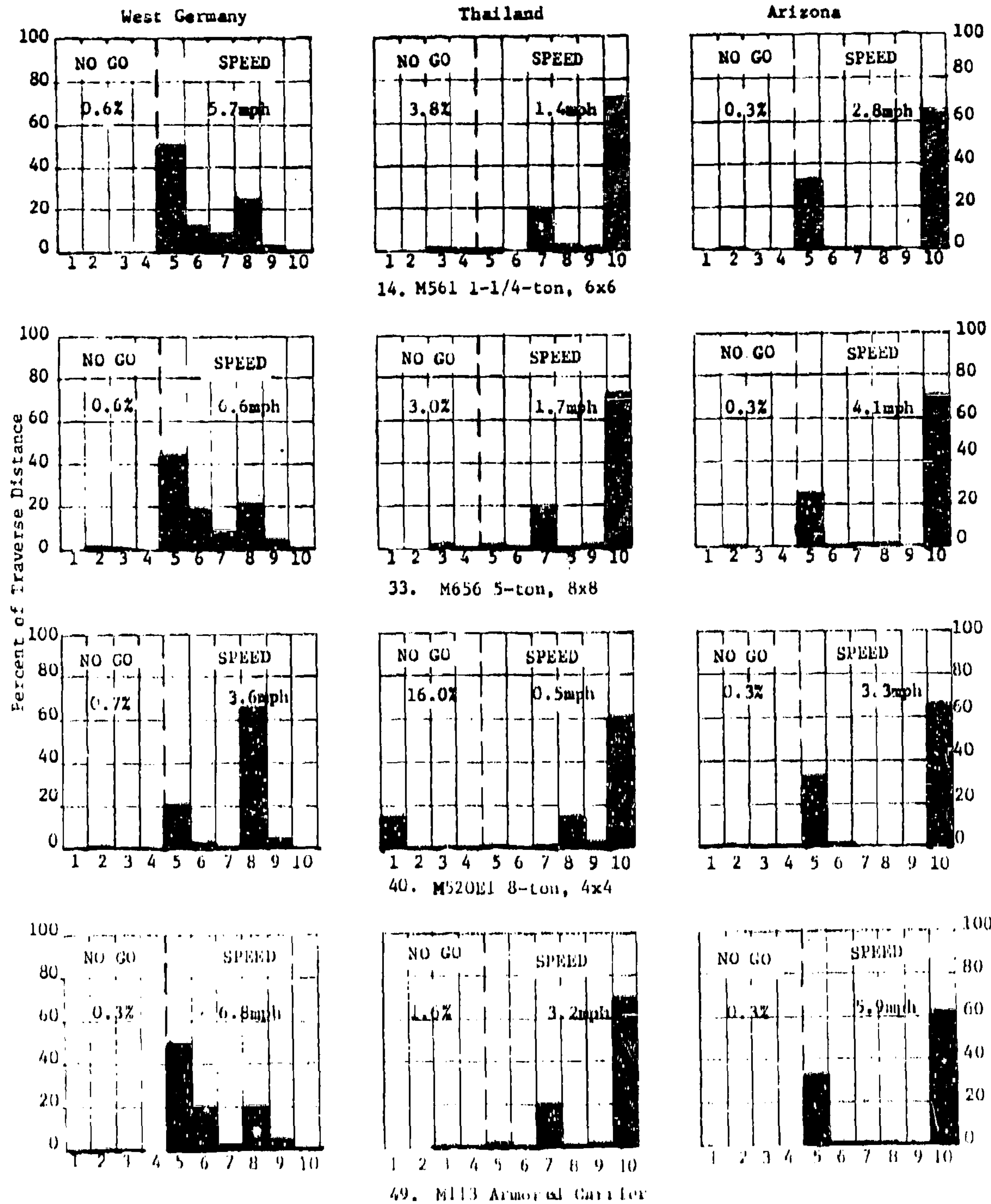


Fig. 24. Factors controlling speed (high-mobility vehicles)

Table 1

Terrain, Vehicle, Driver Attributes Used in Off- and On-Road Performance Prediction Models

Terrain or Road	Vehicle	Driver
	Off Road	
Surface material	Geometric	Reaction time
Type	Mechanical	Recognition distance
Strength	Inertial	V-ride limit
Surface geometry		Vertical acceleration limit
Slope		Horizontal acceleration limit
Discrete obstacles		
Roughness		
Vegetation		
Stem size and spacing		
Visibility		
Hydrologic geometry		
Stream cross section		
Water velocity and depth		
	On Road	
Surface material	Mechanical	V-ride limit
Type	Inertial	
Strength		
Surface geometry		
Slope		
Roughness		
Curvature		

Table [illegible]

Terrain or Road Factors Used in Performance Prediction Models

a. Areal Terrain Units

Terrain Factor	Measurement Unit
Surface	
1. Type	NA
2. Strength	Cone index or rating cone index
3. Slope	Percent
4. Surface roughness	Root mean square elevation, in.
Obstacle	
5. Approach angle	Degree
6. Height	Centimeter
7. Base width	Centimeter
8. Length	Meter
9. Spacing	Meter
10. Type	NA
Vegetation	
11. Stem diameter	Centimeter
12. Stem spacing	Meter
13. Visibility	Meter

b. Linear Terrain Units

Terrain Factor	Measurement Unit
Surface	
1. Type	NA
2. Strength	Cone index or rating cone index
Cross Section	
3. Left approach angle	Degree
4. Differential bank height or differential vertical magnitude	Meter
5. Right approach angle	Degree
6. Low bank height or least vertical magnitude	Meter
7. Base width or top width	Meter
Water	
8. Depth	Meter
9. Velocity	Meters/second

c. Road Units

Road Factor	Measurement Unit
Surface	
1. Type	NA
2. Strength	Cone index or CBR
3. Slope	Degree
4. Curvature	Degree
5. Roughness	Root mean square elevation, in.

Table 1

Vehicle Characteristics Used in AMC '71 Ground Mobility Model

Vehicle M35A2 2 1/2 ton, 6x6 Cargo Truck

Characteristic No.*	Identification	Dimensions	Value	Suggested** Data Source	TACOM Data Sheet Listed	TACOM Data Sheet Measured	TACOM Data Sheet Calculated	APG Data Sheet Listed	APG Data Sheet Measured	APG Data Sheet Calculated	Other Listed	Other Measured	Other Calculated
	General												
1	Vehicle type (VTYPE = 0 for tracked (VTYPE = 1 for wheeled)		1	1	X								
2	Gross vehicle weight	lb	18,[illegible]	1	X								
3	Track type (NTT = 0 for nonflexible, NTT = 1 for flexible)		NA										
4	Grouser height for tracks; number of tires for wheels	in.	10	1	X								
5	Tire ply rating		8	1	X								
6	Gross rated horsepower	hp	140	1	X								
7	Number of people in vehicle on normal mission		2	1	X								
8	Winch capacity (use 0 for vehicle without winch)	lb	0	1	X								
9	Number of tracks or tires		10	1	X								
9a	Number of axles		3	1	X								
10	Vehicle width	in.	96	1	X								
11	Vehicle length	in.	264	1	X								
12	Nominal wheel width	in.	9	1	X								
13	Track width or wheel width	in.	9	1	X								
14	Wheel rim diameter	in.	20	1	X								
15	Recommended tire pressure (highway)	psi	52	1							X	TM	9-300
16	Recommended tire pressure (cross country)	psi	40	1							X	TM	9-500
16a	Recommended tire pressure (sand)	psi	10	1									
17	Area of one track shoe (tracked) or number of wheels (wheeled)	in.²	10	1	X								
18	Number of bogies (tracked) or chain indicator (wheeled), (0 = no chains, 2 = chains)		0	1									
19	Maximum vertical step the vehicle can climb	in.	18.5	1	X								
20	Vehicle ground clearance at the center of the greatest wheel span	in.	10.0	1	X								
20a	Vehicle ground clearance (minimum)	in.	11.0	1	X								
21	Rear end clearance (vertical clearance of vehicle's trailing edge)	in.	32.0	1	X								
22	Vehicle departure angle	deg	40.0	1	X								
23	Vertical clearance of vehicle's leading edge	in.	29.0	1	X								
24	Vehicle approach angle (AV in FIVEYP, VAA in OBSTACL, INPUT)	deg	48.0	1	X								
25	Length of track on ground or wheel diameter	in.	38.0	1	X								
26	Height of vehicle pushbar	in.	29.0	1	X								
27	Distance between the first and last wheel centerlines	in.	178.0	1	X								
28	Horizontal distance from the center of gravity to the front wheel centerlines	in.	101.5	1	X								
29	Vertical distance from the center of gravity to the road wheel centerline	in.	[illegible]	1	X								
30	Maximum span between adjacent wheel centerlines (DWZ in FIVEP, RIVERO)	in.	138.0	1	X								
31	Angle between a line parallel to the ground surface and the line connecting the center of gravity and the center of the rear wheel (road wheel or idler). The wheel is used to determine departure angle	deg	NA	1									
32	Distance from the center of gravity to the center of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle	in.	NA	1									
33	Vertical distance from the ground to the center of the rear wheel (road wheel or idler)	in.	19.1	1						Y	[illegible]	-	[illegible]
34	Track thickness plus the radius of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle. (Dwheelrad + RW)	in.	19.1	1							[illegible]	-	[illegible]
35	Rolling radius of tire or sprocket pitch radius	in.	19.1	1						)	[illegible]	-	[illegible]
36	Height of first point used to determine approach angle	in.	29.	1									

* Items 1-17 are normally listed on vehicle data sheets; items 2[illegible]-[illegible] are normally measured on vehicle or scaled from drawings.
** 1 = TACOM vehicle data sheets, 2 = APG vehicle data sheets, 3 = AMC dynamic submodel, 4 = other sources.

(continued)

(1 of 6 sheets)

Table 1 (Continued)

Charac-teristic No.*	Identification	Dimensions	Value	Suggested** Data Source	TACOM Data Sheet Listed	TACOM Data Sheet Measured	TACOM Data Sheet Calculated	APG Data Sheet Listed	APG Data Sheet Measured	APG Data Sheet Calculated	Other Listed	Other Measured	Other Calculated
	General (Continued)												
37	Maximum braking force the vehicle can develop/ vehicle weight	-	.8	4	Assumed								
38	Loaded wheel radius	in.	18.1	2						X	UPS	-	2394
39	Total ground contact area	in.^{2}	NA	2									
40	Distance vehicle spans before significant motion begins (wheel radius)	in.	19.0	4	Assumed								
41	Maximum force the pushbar can withstand	lb	18,800	4	Used Vehicle Weight								
41a	Maximum axle load/gross weight (0.5 is maximum)		.35								Assumed		
	Power Train												
42	Vehicle rated horsepower per ton (NGHP/Veh Wt in tons. See No. 6)	-	16.9	1			X						
43	Transmission variety (Hydraulic = 0; Mechanical = 1)	-	1	1	X								
44	Transmission type (ITRAN = 1 for manual; ITRAN = 0 for automatic)	-	1	1	X								
45	Final drive gear ratio	-	6.27	1	X								
46	Final drive gear efficiency	-	0.90	1	Assumed								
47	Number of gear ratios in transmission	-	10.0	1	X								
48	Gear ratios for transmission	-	(See sheet 3)	1	X								
49	Transmission efficiency	-	0.90	4	Assumed								
50	Gear ratio from engine to torque converter	-	NA	1									
51	Denotes presence of a torque converter lockup (No = 0; Yes = 1)		NA	1									
52	Input torque at which the torque converter curves were measured	ft-lb	NA	1									
53	Number of point pairs in Array TNK1	-	NA	1,2									
54	Array containing torque converter input speed versus converter torque ratio curve (See attached sheet for values)	-	NA	1,2									
55	Number of point pairs in Array TTM	-	NA	1,2									
56	Array containing torque converter torque multiplying coefficient versus converter speed ratio curve (See attached sheet for values)	-	NA	1,2									
57	Number of point pairs in Array TTK	-	NA	1,2									
58	Array containing net engine torque versus engine speed curve (See attached sheet for values)	-	NA	1,2									
58a	Number of point pairs in the tractive force-speed curve	-	31	2				X					
58b	Array containing tractive force speed curve	-	(See sheet 3)					X					
	Dynamics* **												
59	Number of point pairs in Array VOOA (in CCRVW)	-	29	3									
60	Array containing vehicle velocity versus obstacle height at 2.5 g vertical acceleration		(See sheet 3)	3									
61	Number of points in Array VRIDK	-	7	3		From Dynamics Submodel							
62	Limited speed due to vibration at the driver's seat for surface roughness Class 1	-	(See sheet 3)	3									
	Water												
63	Vehicle swimming speed	mph	0	1									
64	Vehicle fording speed	mph	7.0	1	Assumed								
65	Auxiliary water propulsion factor (No = .5; Yes = .8)	-	.5	1									
66	Ingress swamp angle of the vehicle ((BD to DD)	deg		1									
67	Fording depth or draft height	in.	72 w/kit	1	X								

(Continued) (2 of 4 sheets)

* Items 37 - 41 are normally assumed or calculated from other vehicle characteristics; Items 42 - 52 are normally listed on Vehicle Data Sheets; Items 52 - 53 are normally obtained from TACOM but originate through manufacturers of vehicle's engine and transmission; Items 59-62 are obtained from AMC dynamic submodel; Items 63-67 are normally listed on Vehicle Data Sheets.

** 1 - TACOM vehicle data sheets; 2 - APG vehicle data sheets; 3 - AMC dynamic submodel; 4 - other sources.

*** Vehicle characteristics used by the dynamics submodel to determine dynamics relations below are listed in a separate table.

Table 3 (Continued)

No.	Characteristic Identification	Dimensions	Values									
48	Gear Ratios		9.94	5.50	5.02	3.20	2.78	1.98	1.[illegible]2	1.5[illegible]	1.0	0.79
58B	Tractive Force vs Speed Curve	lb mph	0 5.4 8.[illegible] 15.9 23.2 29.2 51.0	12,340 [illegible],590 4,080 2,8[illegible]0 1,920 1,220 910	2.2 [illegible] 10.[illegible] 14.0 25.0 3[illegible].0 53.0	12,240 6,140 3,950 2,510 1,870 1,210 890	3.2 8.0 12.2 18.4 28.2 42.0 58.0	11,440 5,570 3,670 2,390 1,620 1,120 810	4.3 8.1 13.8 21.1 28.3 45.0 58.0	9840 5370 3290 2220 1570 970 0	4.4 8.6 13.9 23.1 29.1 45.1	6890 5080 3140 2070 1520 960
60	Obstacle Height vs Vehicle Speed Curve	in. mph	1 9 14 19 24 29	84 16.6 [illegible].8 3.7 2.3 1.6	4 10 15 20 25 30	84 13.4 [illegible].0 3.4 2.1 1.5	5 11 16 21 26 40	53.7 11.1 5.2 3.0 2.0 1.5	6 12 17 22 27	37.3 9.3 4.6 2.8 1.8	7 13 18 23 28	27.4 7.9 4.1 2.5 1.7
62	Surface Roughness vs Vehicle Speed	mph	0 3.0	5.0 2.0	0.2 9.0	5.0 1.0	0.5	27.8	1.0	15.2	2.0	3.1

(Continued)

(3 of 4 sheets)

Table 3 (Concluded)

No.	Identification	Dimension	Values
1	No. of Axles	--	3
2	Sprung Mass	Slugs	444.6
3	1/2 Sprung Mass	Slugs	222.3
4	Moment of Inertia	Slug-ft^2	22542
5	1/2 Moment of Inertia	Slug-ft^2	11271
6	*Location of Front Axle Relative to Center of Gravity	ft	8.44
7	Location of Second Axle Relative to Center of Gravity	ft	-2.36
8	Location of Third Axle Relative to Center of Gravity	ft	-6.36
9	Location of Fourth Axle Relative to Center of Gravity	ft	--
10	Location of Driver Relative to Center of Gravity	ft	4.35
11	Spring Constant for Front Axle	lb/ft	9360
12	Spring Constant for Second Axle	lb/ft	6500
13	Spring Constant for Third Axle	lb/ft	6500
14	Spring Constant for Fourth Axle	lb/ft	--
15	Damping Constant for Front Axle	lb-sec/ft	98
16	Damping Constant for Second Axle	lb-sec/ft	229
17	Damping Constant for Third Axle	lb-sec/ft	229
18	Damping Constant for Fourth Axle	lb-sec/ft	--
19	Total Load on Front Axle	lb	6126
20	Bump Stop Height Plus 1/3 of Tire Section Height	in.	7.8
21	Total Effective Spring Rate, Front Axle	lb/in.	1570
22	Wheelbase	in.	155

* (+) Values Indicate Axle Forward of Center of Gravity

Table 4

West Germany Wet-Season Off-Road Speed Predictions for M35A2 2-1/2-ton, 6x6 Cargo Truck

Col 1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
	TERRAIN	% DISTANCE		PREDICTED SPEED		FACTOR LIMITING SPEED				TERRAIN	% DISTANCE		PREDICTED SPEED		FACTOR LIMITING SPEED		
	UNIT#	IN UNIT	ACCUM	IN UNIT	ACCUM	UP	LEVEL	DOWN		UNIT#	IN UNIT	ACCUM	IN UNIT	ACCUM	UP	LEVEL	DOWN
1	201	0.0	0.0	32.2	32.2	6	6	7	51	225	0.0	6.9	20.0	23.2	5	5	5
2	304	0.1	0.1	30.2	30.3	6	6	7	52	294	0.0	7.0	20.0	23.2	5	5	5
3	20	0.1	0.2	30.2	30.2	6	6	7	53	994	0.0	7.0	19.3	23.2	6	5	5
4	299	0.1	0.3	30.2	30.2	6	6	7	54	1142	5.9	12.9	19.0	21.1	6	6	7
5	14	0.1	0.3	30.2	30.2	6	6	7	55	81	0.3	13.2	19.0	21.0	6	6	7
6	318	0.0	0.4	30.2	30.2	6	6	7	56	515	0.2	13.4	19.0	21.0	6	6	7
7	274	0.0	0.4	30.2	30.2	6	6	7	57	1087	0.1	13.5	19.0	21.0	6	6	7
8	27	0.0	0.4	30.2	30.2	6	6	7	58	544	0.1	13.7	19.0	20.9	6	6	7
9	320	0.0	0.4	30.2	30.2	6	6	7	59	510	0.1	13.8	19.0	20.9	6	6	7
10	321	0.0	0.4	30.2	30.2	6	6	7	60	530	0.1	13.9	19.0	20.9	6	6	7
11	282	0.1	0.5	29.2	30.1	9	6	7	61	71	0.1	14.0	19.0	20.9	6	6	7
12	942	0.2	0.7	27.7	29.3	6	9	7	62	1094	0.1	14.0	19.0	20.9	6	6	7
13	325	0.0	3.7	26.8	29.1	10	10	10	63	1134	0.1	14.1	19.0	20.9	6	6	7
14	447	3.0	3.7	24.4	25.2	5	6	7	64	1096	0.1	14.1	19.0	20.9	6	6	7
15	32	0.3	4.0	24.4	25.1	6	6	7	65	1154	0.0	14.2	19.0	20.9	6	6	7
16	56	0.2	4.3	24.4	25.1	6	6	7	66	698	0.0	14.2	19.0	20.8	6	6	7
17	443	0.1	4.3	24.4	25.1	6	6	7	67	1095	0.0	14.3	19.0	20.8	6	6	7
18	365	0.1	4.4	24.4	25.1	6	6	7	68	533	0.0	14.3	19.0	20.8	6	6	7
19	418	0.1	4.5	24.4	25.1	6	6	7	69	1137	0.0	14.3	19.0	20.8	6	6	7
20	376	0.0	4.5	24.4	25.1	6	6	7	70	1106	0.0	14.3	19.0	20.8	6	6	7
21	465	0.0	4.5	24.4	25.1	6	6	7	71	709	0.0	14.3	19.0	20.8	6	6	7
22	403	0.0	4.6	24.4	25.0	6	6	7	72	1175	0.0	14.3	19.0	20.8	6	6	7
23	348	0.0	4.6	24.4	25.0	6	6	7	73	1054	0.0	14.4	18.9	20.8	6	6	10
24	390	0.0	4.6	24.4	25.0	6	6	7	74	1162	0.0	14.4	18.8	20.8	6	6	10
25	333	0.0	4.6	24.4	25.0	6	6	7	75	457	0.7	15.1	18.3	20.7	6	5	5
26	392	0.0	4.6	24.4	25.0	6	6	7	76	336	0.3	15.4	18.3	20.6	6	5	5
27	437	0.0	4.6	24.4	25.0	6	6	7	77	445	0.2	15.6	18.3	20.6	6	5	5
28	395	0.0	4.7	24.4	25.0	6	6	7	78	397	0.2	15.7	18.3	20.6	6	5	5
29	467	0.0	4.7	24.4	25.0	6	6	7	79	38	0.1	15.8	18.3	20.6	6	5	5
30	41	0.0	4.7	24.4	25.0	6	6	7	80	419	0.1	15.9	18.3	20.6	6	5	5
31	958	0.1	4.8	24.0	25.0	6	6	7	81	343	0.1	16.0	18.3	20.5	6	5	5
32	1047	0.6	5.4	20.1	24.3	6	6	6	82	406	0.1	16.0	18.3	20.5	6	5	5
33	1042	0.1	5.5	20.1	24.2	6	6	6	83	454	0.1	16.1	18.3	20.5	6	5	5
34	1021	0.1	5.6	20.1	24.1	6	6	6	84	330	0.1	16.2	18.3	20.5	6	5	5
35	1019	0.1	5.7	20.1	24.1	6	6	6	85	375	0.0	16.2	18.3	20.5	6	5	5
36	996	0.0	5.7	20.1	24.1	6	6	6	86	416	0.0	16.2	18.3	20.5	6	5	5
37	1017	0.0	5.7	20.1	24.0	6	6	6	87	361	0.0	16.3	18.3	20.5	6	5	5
38	1076	0.0	5.7	20.1	24.0	6	6	6	88	407	0.0	16.3	18.3	20.5	6	5	5
39	297	0.6	6.3	20.0	23.6	5	5	5	89	431	0.0	16.4	18.3	20.5	6	5	5
40	208	0.2	6.5	20.0	23.5	5	5	5	90	470	0.0	16.4	18.3	20.5	6	5	5
41	198	0.1	6.6	20.0	23.4	5	5	5	91	386	0.0	16.4	18.3	20.5	6	5	5
42	248	0.1	6.7	20.0	23.4	5	5	5	92	344	0.0	16.4	18.3	20.5	6	5	5
43	200	0.1	6.8	20.0	23.3	5	5	5	93	458	0.0	16.4	18.3	20.5	6	5	5
44	943	0.0	6.8	20.0	23.3	5	5	5	94	1049	0.1	16.5	18.2	20.5	6	5	5
45	286	0.0	6.8	20.0	23.3	5	5	5	95	1028	0.1	16.6	18.2	20.5	6	5	5
46	273	0.0	6.9	20.0	23.3	5	5	5	96	1058	0.0	16.6	18.2	20.4	6	5	5
47	237	0.0	6.9	20.0	23.2	5	5	5	97	1053	0.0	16.6	18.2	20.4	6	5	5
48	940	0.0	6.9	20.0	23.2	5	5	5	98	1008	0.0	16.6	18.2	20.4	6	5	5
49	319	0.0	6.9	20.0	23.2	5	5	5	99	596	0.0	16.6	17.7	20.4	8	6	7
50	207	0.0	6.9	20.0	23.2	5	5	5	100	1165	0.1	16.7	17.3	20.4	10	10	10

Legend given at end of listing (sheet 6)

(Continued)

Table 4 (Continued)

Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down	Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
101	524	0.0	16.7	16.8	20.4	9	6	7	151	969	0.1	24.1	13.7	18.5	6	5	5
102	547	0.0	16.8	16.8	20.4	9	6	7	152	968	0.0	24.1	13.7	18.5	6	5	5
103	598	0.0	16.8	16.8	20.4	9	6	7	153	1197	0.2	24.4	13.5	18.4	6	5	5
104	567	0.0	16.8	16.8	20.4	9	6	7	154	1264	0.1	24.5	13.5	18.4	6	5	5
105	971	0.1	16.9	16.7	20.4	6	9	7	155	1255	0.1	24.5	13.5	18.3	6	5	5
106	966	0.1	17.0	16.7	20.4	6	9	7	156	1266	0.1	24.6	13.5	18.3	6	5	5
107	1179	0.1	17.1	16.2	20.3	6	5	5	157	1190	0.1	24.7	13.5	18.3	6	5	5
108	1082	0.1	17.2	16.2	20.3	6	5	5	158	1213	0.0	24.7	13.5	18.3	6	5	5
109	1126	0.0	17.2	16.2	20.3	6	5	5	159	1204	0.0	24.7	13.5	18.3	6	5	5
110	1099	0.0	17.3	16.2	20.3	6	5	5	160	1211	0.0	24.8	13.5	18.3	6	5	5
111	1109	0.0	17.3	16.2	20.3	6	5	5	161	1217	0.0	24.8	13.5	18.3	6	5	5
112	1143	0.0	17.3	16.2	20.3	6	5	5	162	964	0.0	24.8	13.2	18.3	9	10	10
113	1139	0.0	17.3	16.2	20.3	6	5	5	163	1387	0.0	24.8	12.4	18.3	6	6	6
114	1100	0.0	17.3	16.2	20.3	6	5	5	164	1273	0.1	24.9	12.3	18.2	9	9	5
115	1173	0.0	17.3	16.2	20.3	6	5	5	165	427	2.2	27.1	12.1	17.5	9	9	8
116	1052	0.1	17.4	15.9	20.2	9	9	5	166	1386	0.3	27.4	12.1	17.4	6	6	5
117	1259	2.6	20.0	15.3	19.4	6	6	7	167	468	0.2	27.7	12.1	17.4	9	10	10
118	1193	0.3	20.3	15.3	19.3	6	6	7	168	52	0.1	27.8	12.1	17.3	9	9	7
119	1256	0.1	20.4	15.3	19.3	6	6	7	169	1382	0.1	27.9	12.1	17.3	6	6	5
120	1202	0.1	20.5	15.3	19.3	6	6	7	170	350	0.0	27.9	12.1	17.3	9	9	8
121	1201	0.1	20.5	15.3	19.3	6	6	7	171	1384	0.0	27.9	12.1	17.3	6	6	5
122	1196	0.1	20.6	15.3	19.3	6	6	7	172	634	2.7	30.6	11.5	16.6	9	9	8
123	1223	0.1	20.7	15.3	19.2	6	6	7	173	86	0.1	30.7	11.5	16.5	9	9	8
124	1360	0.0	20.8	15.3	19.2	6	6	7	174	677	0.0	30.7	11.5	16.5	9	9	8
125	1361	0.0	20.8	15.3	19.2	6	6	7	175	686	0.0	30.7	11.5	16.5	9	9	8
126	1214	0.0	20.8	15.3	19.2	6	6	7	176	1375	1.2	31.9	11.4	16.3	6	6	9
127	113	0.3	21.0	15.2	19.2	6	5	5	177	1377	0.3	32.2	11.4	16.2	6	6	9
128	616	0.2	21.2	15.2	19.1	6	5	5	178	1376	0.1	32.3	11.4	16.2	6	6	9
129	543	0.1	21.3	15.2	19.1	6	5	5	179	1370	0.0	32.3	11.4	16.2	6	6	9
130	527	0.1	21.4	15.2	19.1	6	5	5	180	1380	0.0	32.3	11.4	16.2	6	6	9
131	613	0.1	21.4	15.2	19.1	6	5	5	181	1392	0.1	32.4	11.2	16.2	6	6	7
132	665	0.1	21.5	15.2	19.1	6	5	5	182	1083	0.0	32.4	11.0	16.1	9	9	8
133	574	0.0	21.5	15.2	19.0	6	5	5	183	632	0.1	32.5	10.3	16.1	9	9	7
134	564	0.0	21.6	15.2	19.0	6	5	5	184	1395	0.0	$\boxed{32.5}$	$\boxed{10.3}$	16.1	6	6	5
135	93	0.0	21.6	15.2	19.0	6	5	5	185	191	0.5	33.0	9.9	16.0	9	6	7
136	697	0.0	21.7	15.2	19.0	6	5	5	186	746	0.2	33.2	9.9	15.9	9	6	7
137	558	0.0	21.7	15.2	19.0	6	5	5	187	128	0.1	33.4	9.9	15.9	9	6	7
138	652	0.0	21.8	15.2	19.0	6	5	5	188	863	0.1	33.5	9.9	15.8	9	6	7
139	553	0.0	21.8	15.2	19.0	6	5	5	189	866	0.1	33.5	9.9	15.8	9	6	7
140	24	1.7	23.5	14.9	18.6	9	9	8	190	792	0.1	33.6	9.9	15.8	9	6	7
141	19	0.1	23.6	14.9	18.6	9	9	8	191	850	0.0	33.6	9.9	15.8	9	6	7
142	295	0.0	23.6	14.9	18.6	9	9	8	192	749	0.0	33.6	9.9	15.8	9	6	7
143	941	0.0	23.6	14.9	18.6	9	9	8	193	116	0.0	33.7	9.9	15.8	9	6	7
144	4	0.0	23.7	14.9	18.6	9	9	8	194	868	0.0	33.7	9.9	15.8	9	6	7
145	937	0.0	23.7	14.8	18.6	9	10	10	195	832	0.0	33.7	9.9	15.8	9	6	7
146	568	0.2	23.8	13.8	18.5	9	5	5	196	869	0.0	33.7	9.9	15.8	9	6	7
147	611	0.1	24.0	13.8	18.5	9	5	5	197	401	0.0	33.7	9.8	15.8	9	7	7
148	679	0.0	24.0	13.8	18.5	9	5	5	198	1330	0.5	34.2	9.3	15.6	6	6	7
149	592	0.0	24.0	13.8	18.5	9	5	5	199	1299	0.1	34.3	9.3	15.6	6	6	7
150	569	0.0	24.0	13.8	18.5	9	5	5	200	1333	0.1	34.4	9.3	15.6	6	6	7

(Continued)

Percent of terrain in which in-unit speed does not fall below 10 mph is 32.5%.

(2 of 6 sheets)

[illegible] 4 (Continued)

	TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN		TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
201	1296	0.0	34.4	9.3	15.5	6	6	7	251	673	3.9	47.7	7.7	12.2	5	5	5
202	1293	0.0	34.5	9.3	15.5	6	6	7	252	292	1.9	49.6	7.7	12.0	5	5	5
203	1320	0.0	34.5	9.3	15.5	6	6	7	253	1265	1.7	51.2	7.7	11.8	5	5	5
204	912	0.2	34.7	9.0	15.4	6	6	7	254	313	1.4	52.6	7.7	11.6	5	5	5
205	683	0.1	34.9	9.0	15.4	6	6	7	255	104	0.7	53.4	7.7	11.5	5	5	5
206	916	0.1	35.0	9.0	15.4	6	6	7	256	1071	0.7	54.1	7.7	11.4	5	5	5
207	891	0.0	35.0	9.0	15.4	6	6	7	257	490	0.6	54.7	7.7	11.4	5	5	5
208	354	0.0	35.1	9.0	15.3	9	8	8	258	55	0.6	55.3	7.7	11.3	5	5	5
209	164	0.0	35.1	9.0	15.3	6	6	7	259	988	0.5	55.8	7.7	11.3	5	5	5
210	174	0.0	35.1	9.0	15.3	6	6	7	260	42	0.4	56.2	7.7	11.2	5	5	5
211	172	0.0	35.1	9.0	15.3	6	6	7	261	1172	0.4	56.5	7.7	11.2	5	5	5
212	766	0.3	35.4	8.8	15.2	9	5	5	262	262	0.3	56.8	7.7	11.2	5	5	5
213	127	0.2	35.5	8.8	15.2	9	5	5	263	990	0.3	57.1	7.7	11.2	5	5	5
214	830	0.1	35.7	8.8	15.2	9	5	5	264	63	0.3	57.4	7.7	11.1	5	5	5
215	821	0.1	35.8	8.8	15.1	9	5	5	265	66	0.2	57.6	7.7	11.1	5	5	5
216	126	0.1	35.9	8.8	15.1	9	5	5	266	565	0.2	57.8	7.7	11.1	5	5	5
217	162	0.1	36.0	8.8	15.1	9	5	5	267	784	0.2	58.1	7.7	11.1	5	5	5
218	1295	0.1	36.0	8.8	15.0	6	5	5	268	584	0.2	58.3	7.7	11.1	5	5	5
219	1294	0.1	36.1	8.8	15.0	6	5	5	269	37	0.2	58.5	7.7	11.0	5	5	5
220	1292	0.1	36.1	8.8	15.0	6	5	5	270	72	0.2	58.6	7.7	11.0	5	5	5
221	775	0.1	36.2	8.8	15.0	9	5	5	271	360	0.2	58.8	7.7	11.0	5	5	5
222	860	0.1	36.2	[illegible]	15.0	9	5	5	272	1225	0.1	58.9	7.7	11.0	5	5	5
223	117	0.0	36.3		15.0	8	5	5	273	1169	0.1	59.0	7.7	11.0	5	5	5
224	740	0.0	36.3		15.0	9	5	5	274	26	0.1	59.2	7.7	11.0	5	5	5
225	.48	0.0	36.4	8.	14.9	9	5	5	275	358	0.1	59.3	7.7	11.0	5	5	5
226	838	0.0	36.4	8.8	14.9	9	5	5	276	1089	0.1	59.4	7.7	11.0	5	5	5
227	1338	0.0	36.4	8.8	14.9	6	5	5	277	1372	0.1	59.5	7.7	11.0	5	5	5
228	980	0.0	36.4	8.8	14.9	[illegible]	5	5	278	1364	0.1	59.7	7.7	10.9	5	5	5
229	776	0.0	36.5	8.8	14.9	9	5	5	279	1253	0.1	59.8	7.7	10.9	5	5	5
230	1337	0.0	36.5	8.6	14.9	6	10	10	280	1369	0.1	59.9	7.7	10.9	5	5	5
231	179	0.2	36.7	8.4	14.9	6	5	5	281	961	0.1	60.0	7.7	10.9	5	5	5
232	920	0.0	36.7	8.4	14.8	6	5	5	282	692	0.1	60.1	7.7	10.9	5	5	5
233	902	0.0	36.8	8.4	14.8	6	5	5	283	381	0.1	60.2	7.7	10.9	5	5	5
234	898	0.0	36.8	8.4	14.8	6	5	5	284	349	0.1	60.3	7.7	10.9	5	5	5
235	132	0.0	36.8	8.4	14.8	6	7	7	285	1368	0.1	60.4	7.7	10.9	5	5	5
236	33	0.0	36.8	8.4	14.8	7	7	7	286	674	0.1	60.4	7.7	10.9	5	5	5
237	173	0.0	36.8	8.4	14.8	6	5	5	287	541	0.1	60.5	7.7	10.9	5	5	5
238	100	0.1	36.9	8.3	14.8	9	7	7	288	314	0.1	60.6	7.7	10.9	5	5	5
239	767	0.0	37.0	8.3	14.8	9	[illegible]	8	289	393	0.1	60.7	7.7	10.9	5	5	5
240	555	0.0	37.0	8.3	14.7	9	7	7	290	999	0.1	60.8	7.7	10.9	5	5	5
241	83	0.0	37.0	8.3	14.7	9	7	7	291	1123	0.1	60.9	7.7	10.9	5	5	5
242	1354	0.0	37.0	8.2	14.7	6	5	5	292	939	0.1	60.9	7.7	10.8	5	5	5
243	1402	0.1	37.1	7.9	14.7	6	6	5	293	1088	0.1	61.0	7.7	10.8	5	5	5
244	1406	0.1	37.2	7.9	14.7	6	6	5	294	5	0.1	61.1	7.7	10.8	5	5	5
245	146	0.0	37.2	7.9	14.7	6	9	7	295	214	0.1	61.1	7.7	10.8	5	5	5
246	118	0.0	37.2	7.9	14.7	9	9	8	296	246	0.1	61.2	7.7	10.8	5	5	5
247	735	0.0	37.2	7.9	14.7	9	9	8	297	227	0.1	61.3	7.7	10.8	5	5	5
248	1399	0.0	37.3	7.9	14.7	6	6	5	298	1136	0.1	61.3	7.7	10.8	5	5	5
249	834	0.0	37.3	7.9	14.7	9	9	8	299	224	0.1	61.4	7.7	10.8	5	5	5
250	1056	3.5	43.8	7.7	12.9	5	5	5	300	75	0.0	61.4	7.7	10.8	5	5	5

(Continued)

Table No. 4 (Cont)

Terrain Units		% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down	Terrain Units		% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
301	1085	0.0	61.5	7.7	10.8	5	5	5	351	1326	0.3	67.7	6.0	10.2	6	5	5
302	1066	0.0	61.5	7.7	10.8	5	5	5	352	854	0.2	68.0	6.0	10.2	9	5	5
303	1256	0.0	61.6	7.7	10.8	5	5	5	353	1386	0.2	68.2	6.0	10.2	6	5	5
304	699	0.0	61.6	7.7	10.8	5	5	5	354	777	0.2	68.4	6.0	10.1	9	5	5
305	259	0.0	61.6	7.7	10.8	5	5	5	355	833	0.1	68.5	6.0	10.1	9	5	5
306	1241	0.0	61.7	7.7	10.8	5	5	5	356	789	0.1	68.6	6.0	10.1	9	5	5
307	1199	0.0	61.7	7.7	10.8	5	5	5	357	135	0.1	68.7	6.0	10.1	9	5	5
308	1234	0.0	61.8	7.7	10.8	5	5	5	358	793	0.1	68.7	6.0	10.1	9	5	5
309	1104	0.0	61.8	7.7	10.8	5	5	5	359	725	0.1	68.8	6.0	10.1	9	5	5
310	1138	0.0	61.8	7.7	10.8	5	5	5	360	1321	0.1	65.9	6.0	10.1	6	5	5
311	603	0.0	61.9	7.7	10.8	5	5	5	361	843	0.1	68.9	6.0	10.1	9	5	5
312	296	0.0	61.9	7.7	10.8	5	5	5	362	774	0.0	69.0	6.0	10.1	9	5	5
313	639	0.0	61.9	7.7	10.8	5	5	5	363	804	0.0	69.0	6.0	10.1	9	5	5
314	559	0.0	61.9	7.7	10.8	5	5	5	364	744	0.0	69.0	6.0	10.1	9	5	5
315	1235	0.0	62.0	7.7	10.8	5	5	5	365	861	0.0	69.0	6.0	10.1	9	5	5
316	242	0.0	62.0	7.7	10.8	5	5	5	366	979	0.0	69.1	6.0	10.1	6	5	5
317	391	0.0	62.0	7.7	10.8	5	5	5	367	778	0.0	69.1	6.0	10.1	9	5	5
318	1186	0.0	62.1	7.7	10.8	5	5	5	368	1289	0.0	69.1	6.0	10.1	6	5	5
319	1239	0.0	62.1	7.7	10.8	5	5	5	369	750	0.0	69.1	6.0	10.1	9	5	5
320	1051	0.0	62.1	7.7	10.8	5	5	5	370	158	0.0	69.1	6.0	10.1	9	5	5
321	1282	0.0	62.1	7.7	10.8	5	5	5	371	859	0.0	69.1	6.0	10.1	9	5	5
322	288	0.0	62.2	7.7	10.8	5	5	5	372	877	0.0	69.1	6.0	10.1	9	5	5
323	973	0.0	62.2	7.7	10.8	5	5	5	373	186	0.2	69.3	5.8	10.1	6	5	5
324	432	0.0	62.2	7.7	10.8	5	5	5	374	915	0.1	69.4	5.8	10.0	6	5	5
325	1081	0.0	62.2	7.7	10.8	5	5	5	375	187	0.1	69.5	5.8	10.0	6	5	5
326	494	0.0	62.2	7.7	10.8	5	5	5	376	1404	0.0	69.5	5.8	10.0	6	5	5
327	244	0.0	62.2	7.7	10.8	5	5	5	377	133	0.2	69.8	5.5	10.0	9	8	8
328	213	0.0	62.3	7.7	10.8	5	5	5	378	768	0.0	69.8	5.5	10.0	9	8	8
329	471	0.0	62.3	7.7	10.8	5	5	5	379	872	0.0	69.8	5.5	10.0	9	8	8
330	945	0.0	62.3	7.7	10.8	5	5	5	380	978	0.1	69.8	5.2	10.0	8	8	8
331	489	0.0	62.3	7.7	10.8	5	5	5	381	176	0.0	69.9	5.1	10.0	9	7	7
332	1853	0.0	62.3	7.7	10.8	5	5	5	382	1318	0.1	69.9	4.6	10.0	8	9	8
333	1029	0.0	62.3	7.7	10.8	5	5	5	383	155	1.7	71.6	4.4	9.7	8	9	8
334	364	0.0	62.3	7.7	10.8	5	5	5	384	908	0.3	71.9	4.4	9.6	8	9	8
335	239	0.0	62.3	7.7	10.8	5	5		385	165	0.0	72.0	4.4	9.6	8	9	8
336	1273	0.0	62.3	7.7	10.8	5	5	5	386	504	0.0	72.0	3.9	9.6	10	10	10
337	1181	0.0	62.3	7.7	10.8	5	5	5	387	184	0.0	72.0	3.8	9.6	8	5	5
338	1079	0.0	62.3	7.7	10.8	5	5	5	388	182	0.0	72.0	3.8	9.6	8	5	5
339	1398	0.2	62.5	7.0	10.7	6	5	5	389	901	0.0	72.1	3.6	9.6	8	8	8
340	801	0.0	62.5	6.9	10.7	9	7	7	390	1846	6.6	78.6	3.0	8.1	5	5	5
341	98	3.7	66.2	6.6	10.4	8	8	8	391	1152	4.5	83.1	3.0	7.4	5	5	5
342	10	0.3	66.5	6.6	10.3	8	8	6	392	681	1.3	84.4	3.0	7.3	5	5	5
343	841	0.0	66.6	6.6	10.3	8	8	8	393	840	1.2	85.6	3.0	7.1	5	5	5
344	408	0.0	66.6	6.6	10.3	8	8	8	394	989	0.5	86.1	3.0	7.1	5	5	5
345	1832	0.0	66.6	6.6	10.3	8	8	8	395	741	0.2	86.3	3.0	7.0	5	5	5
346	936	0.0	66.6	6.6	10.3	8	8	8	396	780	0.2	86.4	3.0	7.0	5	5	5
347	463	0.0	66.6	6.6	10.3	8	8	8	397	138	0.1	86.6	3.0	7.0	5	5	5
348	149	0.1	66.7	6.4	10.3	9	8	8	398	25	0.1	86.7	3.0	7.0	5	5	5
349	731	0.5	67.1	6.0	10.3	8	5	5	399	1365	0.1	86.9	3.0	7.0	5	5	5
350	846	0.3	67.4	6.0	10.2	9	5	5	400	528	0.1	87.0	3.0	7.0	5	5	5

(Continued)

Percent of "best" terrain in which overall average speed does not fall below 10 mph is 69.9%.

(4 of 6 sheets)

Table 4 (Continued)

TERRAIN UNIT#		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR UP	LIMITING LEVEL	SPEED DOWN	TERRAIN UNIT#		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR UP	LIMITING LEVEL	SPEED DOWN
401	1403	0.1	87.1	3.0	7.0	5	5	5	442	272	0.0	88.7	3.0	6.8	5	5	5
402	1119	0.1	87.2	3.0	7.0	5	5	5	443	1149	0.0	88.7	3.0	6.8	5	5	5
403	1118	0.1	87.3	3.0	6.9	5	5	5	444	425	0.0	88.7	3.0	6.8	5	5	5
404	743	0.1	87.4	3.0	6.9	5	5	5	445	1061	0.0	88.7	3.0	6.8	5	5	5
405	1122	0.1	87.4	3.0	6.9	5	5	5	446	1066	0.0	88.7	3.0	6.8	5	5	5
406	103	0.1	87.5	3.0	6.9	5	5	5	447	1144	0.0	88.7	3.0	6.8	5	5	5
407	48	0.1	87.6	3.0	6.9	5	5	5	448	263	0.0	88.7	3.0	6.8	5	5	5
408	1227	0.1	87.7	3.0	6.9	5	5	5	449	455	0.0	88.7	3.0	6.6	5	5	5
409	409	0.1	87.8	3.0	6.9	5	5	5	450	148	3.2	91.9	2.6	6.4	8	8	8
410	409	0.1	87.8	3.0	6.9	5	5	5	451	53	2.4	94.3	2.6	6.2	8	8	8
411	1130	0.1	87.9	3.0	6.9	5	5	5	452	270	2.2	96.6	2.6	6.0	8	8	8
412	1397	0.1	88.0	3.0	6.9	5	5	5	453	819	1.7	98.3	2.6	5.9	8	8	8
413	682	0.1	88.0	3.0	6.9	5	5	5	454	694	0.2	98.5	2.6	5.9	8	8	8
414	919	0.1	88.1	3.0	6.9	5	5	5	455	45	0.2	98.7	2.6	5.8	8	8	8
415	539	0.0	88.1	3.0	6.9	5	5	5	456	276	0.1	98.8	2.6	5.8	8	8	8
416	791	0.0	88.2	3.0	6.9	5	5	5	457	435	0.1	98.9	2.6	5.8	8	8	8
417	614	0.0	88.2	3.0	6.8	5	5	5	458	307	0.1	99.0	2.6	5.8	8	8	8
418	829	0.0	88.2	3.0	6.8	5	5	5	459	1277	0.1	99.1	2.6	5.8	5	5	5
419	590	0.0	88.3	3.0	6.8	5	5	5	460	1317	0.0	99.1	2.6	5.8	5	5	5
420	157	0.0	88.3	3.0	6.8	5	5	5	461	531	0.0	99.1	2.6	5.8	8	8	8
421	1260	0.0	88.4	3.0	6.8	5	5	5	462	1033	0.0	99.1	2.6	5.8	5	5	5
422	955	0.0	88.4	3.0	6.8	5	5	5	463	944	0.0	99.1	2.6	5.8	8	8	8
423	1388	0.0	88.4	3.0	6.8	5	5	5	464	723	0.1	99.2	2.4	5.8	10	10	10
424	1065	0.0	88.4	3.0	6.8	5	5	5	465	485	0.0	99.2	2.2	5.8	8	8	8
425	638	0.0	88.5	3.0	6.8	5	5	5	466	474	0.0	99.3	2.2	5.8	5	5	5
426	751	0.0	88.5	3.0	6.8	5	5	5	467	1034	0.0	99.3	2.2	5.8	5	5	5
427	595	0.0	88.5	3.0	6.8	5	5	5	468	436	0.0	99.3	2.2	5.8	8	8	8
428	159	0.0	88.5	3.0	6.8	5	5	5	469	879	0.0	99.3	2.2	5.8	10	10	10
429	219	0.0	88.6	3.0	6.8	5	5	5	470	482	0.1	99.4	0.8	5.8	8	8	8
430	808	0.0	88.6	3.0	6.8	5	5	5	471	786	0.1	99.4	0.7	5.7	8	8	8
431	679	0.0	88.6	3.0	6.8	5	5	5	472	845	0.0	99.4	0.6	5.7	8	8	8
432	247	0.0	88.6	3.0	6.8	5	5	5	473	1437	0.2	99.6	0.1	5.2	2	2	2
433	1311	0.0	88.6	3.0	6.8	5	5	5	474	1070	0.1	99.7	0.1	4.9	3	3	3
434	1090	0.0	88.6	3.0	6.8	5	5	5	475	1355	0.1	99.8	0.1	4.7	2	2	2
435	1044	0.0	88.7	3.0	6.8	5	5	5	476	928	0.1	99.9	0.1	4.6	2	2	2
436	1057	0.0	88.7	3.0	6.8	5	5	5	477	1170	0.1	99.9	0.1	4.5	3	3	3
437	144	0.0	88.7	3.0	6.8	5	5	5	478	62	0.0	100.0	0.1	4.4	3	3	3
438	1229	0.0	88.7	3.0	6.8	5	5	5	479	932	0.0	100.0	0.1	4.3	2	2	2
439	23	0.0	88.7	3.0	6.8	5	5	5	480	927	0.0	100.0	0.1	4.3	2	2	2
440	842	0.0	88.7	3.0	6.8	5	5	5	481	929	0.0	100.0	0.1	4.3	2	2	2
441	293	0.0	88.7	3.0	6.8	5	5	5									

NOGO

Average speed in 90% "best" areal terrain, V_{90} = 6.6 mph

Percent of area which is GO is 99.4%

Average speed in all areal terrain, V_{100} = 4.3 mph

(Continued)

Table 4 (Concluded)

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N= 50	N=100	N=150	N=200	N=250	N=300	N=350	N=400	N=450	N=481	REASONS FOR [illegible]
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	SURFACE STRENGTH < MAXIMUM REQUIRED FOR ONE PASS
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	TRACTION AVAILIABLE < SURFACE AND SLOPE RESISTANCES
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	OBSTACLE INTERFERENCE
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	TRACTION AVAILIABLE < SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES

REASONS FOR LIMITED SPEED

FACTOR LIMITING SPEED	N= 50	N=100	N=150	N=200	N=250	N=300	N=350	N=400	N=450	N=481	REASONS
5	17.7	16.5	16.3	13.4	28.0	48.7	46.6	54.9	53.9	49.7	RIDE DYNAMICS
6	57.1	57.8	51.8	43.6	35.9	25.6	23.4	18.5	17.5	16.1	SURFACE AND SLOPE RESISTANCES
7	22.7	24.2	21.9	17.4	14.5	10.4	9.4	7.3	6.9	6.4	VISIBILITY
8	0.0	0.1	2.7	6.8	5.5	3.9	9.9	9.6	12.6	18.9	MANEUVER
9	1.9	0.8	6.9	18.1	15.4	11.5	10.2	9.2	8.7	8.0	SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
10	0.6	0.6	0.4	0.8	0.7	0.5	0.4	0.3	0.3	0.4	ACCELERATION AND DECELERATION BETWEEN OBSTACLES

(6 of 6 sheets)

Table 5

Terrain Factors and Terrain Factor Classes Used to Describe Areal Terrain for Ground Mobility

Terrain Factors	Class Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Surface Type	Fine Grained Soils	Coarse Grained Soils	Muskeg	Non Permanent Snow	Permanent Snow									
*Surface Strength (CI or RCI) Class Range	>280	221-280	161-220	101-160	41-100	41-60	33-40	26-32	17-25	11-16	9-13	13-25	7-12	0-6
Value Selected for Prediction	300	250	190	130	80	50	36	29	20	14	5	19	10	3
Slope (%) Class Range	0-2	2.1-5	5.1-10	10.1-20	20.1-40	40.1-60	60.1-70	>70						
Value Selected for Prediction	1	3.5	7.5	15.0	30.0	50.0	65.0	72.0						
Obstacle Approach Angle (Deg) Class Range	178.6-180	180-181.5	175.6-178.5	181.5-184.5	170.1-175.5	184.5-190	158.1-170	190.1-202	149.1-202	202.1-211	135.1-149	211.1-225	90.0-135	226-270
Value Selected for Prediction	179	181	177	183	173	187	164	196	154	206	142	218	112	248
Obstacle Vertical Magnitude (in.) Class Range	0-6	6.1-10	10.1-14	14.1-18.0	18.1-23.6	23.7-33.5	>33.5							
Value Selected for Prediction	3	8	12	16	20	28	33.5							
Obstacle Base Width (in.) Class Range	>47	36-47	24-35	12-24	0-12									
Value Selected for Prediction	162	41	30	18	6									
Obstacle Length (ft) Class Range	0-1	1.1-3.3	3.4-6.6	6.7-10.0	10.1-19.9	20.0-492	>492							
Value Selected for Prediction	.66	2.0	4.9	8.2	14.8	256	492							
Obstacle Spacing (ft) Class Range	Bare	65.7-197.0	36.4-65.6	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Value Selected for Prediction	197.0	131	50.9	31.2	22.3	15.7	10.8	3.9						
Obstacle Spacing Type	Random	Linear												
Surface Roughness Class Range	0-.4	.5-1.5	1.6-2.5	2.6-3.5	3.6-4.5	4.6-5.5	5.6-6.5	6.6-7.5	7.6					
Value Selected for Prediction	.2	1	2	3	4	5	6	7	8					
Stem Diameter (in.)		>1.0	>2.4	>3.9	5.5	7.0	8.7	9.8						
Factor Value	0	1.2	2.4	3.9	5.5	7.0	8.7	9.8						
Stem Spacing (ft) Class Range	Bare	>65.6	36.4-65.6	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Value Selected for Prediction	328	65.6	50.9	31.2	22.3	15.7	10.8	3.9						
Visibility (ft) Class Range	>164	79.0-164	39.6-78.9	29.8-39.5	20.0-29.7	15.1-19.9	10.1-15.0	5.1-10.0	0-5.0					
Value Selected for Prediction	164	122	59	34.8	24.6	17.4	12.5	7.5	2.6					
Snow Depth (cm) Class Range	2.5-30.5	30.6-45.7	45.8-61.0	61.1-76.2	76.3-91.4	91.5-121.9	122.0-152.5	152.6-182.9	>182.9					
Value Selected for Prediction	16.5	38.2	53.4	68.6	83.8	106.7	137.2	167.8	182.9					
Snow Moisture Condition	Dry	Wet												

* Surface strength for dry, average, and wet seasons

Table 6

Terrain Factors and Terrain Factor Classes Used to Describe Linear Terrain (Streams) as Used in This Study

1. Differential Bank Height

Class No.	Class Range, m	Value Selected for Prediction, m
1	0	0
2	N/W bank (0.1-1) higher than S/E	0.5
3	N/W bank (1.1-2) higher than S/E	1.5
4	N/W bank (2.1-4) higher than S/E	3.0
5	N/W bank (4)	4.0
6	S/E bank (0.1-1) higher than N/W	0.5
7	S/E bank (1.1-2)	1.5
8	(2.1-4)	3.0
	(> 4)	4.0

2. Gap Side Slope

Class No.	Class Range, deg	Value Selected for Prediction, deg
1	180-185	182.5
2	185.1-190	187.5
3	190.1-200	195.0
4	200.1-210	205.0
5	210.1-220	215.0
6	220.1-230	225.0
7	230.1-250	240.0
8	250.1-260	255.0
9	260.1-265	262.5
10	265.1-270	267.5

(Continued)

(1 of 3 sheets)

Table 6 (Continued)

3. Water depth

Class No.	Class Range, cm	Value Selected for Prediction, cm
1	0-100	50
2	101-200	150
3	201-500	350
4	>500	500

4. Water velocity

Class No.	Class Range, mps	Value Selected for Prediction, mps
1	No water	NA
2	0	0
3	0-1	0.5
4	1.1-2	1.5
5	2.1-3.5	2.8
6	3.5	3.5

5. Water width

Class No.	Class Range m	Value Selected for Prediction m	Class No.	Class Range m	Value Selected for Prediction m
1	No water	0	46	200.1-205	202.5
2	0.1-3	1.5	47	205.1-210	207.5
3	3.1-6	4.5	48	210.1-215	212.5
4	6.1-9	7.5	49	215.1-220	217.5
5	9.1-12	10.5	50	220.1-225	222.5
6	12.1-15	13.5	51	225.1-230	227.5
7	15.1-18	16.5	52	230.1-235	232.5
8	18.1-21	19.5	53	235.1-240	237.5
9	21.1-24	22.5	54	240.1-245	242.5
10	24.1-27	25.5	55	245.1-250	247.5
11	27.1-30	28.5	56	250.1-255	252.5
12	30.1-35	32.5	57	255.1-260	257.5
13	35.1-40	37.5	58	260.1-265	262.5
14	40.1-45	42.5	59	265.1-270	267.5
15	45.1-50	47.5	60	270.1-275	272.5
16	50.1-55	52.5	61	275.1-280	277.5
17	55.1-60	57.5	62	280.1-285	282.5
18	60.1-65	62.5	63	285.1-290	287.5

(Continued)

Table 6 (Concluded)

Class No.	Class Range m	Value Selected for Prediction m	Class No.	Class Range m	Value Selected for Prediction m
19	65.1-70	67.5	64	290.1-295	292.5
20	70.1-75	72.5	65	295.1-300	297.5
21	75.1-80	77.5	66	300.1-305	302.5
22	80.1-85	82.5	67	305.1-310	307.5
23	85.1-90	87.5	68	310.1-315	312.5
24	90.1-95	92.5	69	315.1-320	317.5
25	95.1-100	97.5	70	320.1-325	322.5
26	100.1-105	102.5	71	325.1-330	327.5
27	105.1-110	107.5	72	330.1-335	332.5
28	110.1-115	112.5	73	335.1-340	337.5
29	115.1-120	117.5	74	340.1-345	342.5
30	120.1-125	122.5	75	345.1-350	347.5
31	125.1-130	127.5	76	350.1-355	352.5
32	130.1-135	132.5	77	355.1-360	357.5
33	135.1-140	137.5	78	360.1-365	362.5
34	140.1-145	142.5	79	365.1-370	367.5
35	145.1-150	147.5	80	370.1-375	372.5
36	150.1-155	152.5	81	375.1-380	377.5
37	155.1-160	157.5	82	380.1-385	382.5
38	160.1-165	162.5	83	385.1-390	387.5
39	165.1-170	167.5	84	390.1-395	392.5
40	170.1-170	172.5	85	395.1-400	397.5
41	175.1-180	177.5	86	400.1-405	402.5
42	180.1-185	182.5	87	405.1-410	407.5
43	185.1-190	187.5	88	410.1-415	412.5
44	190.1-195	192.5	89	415.1-420	417.5
45	195.1-200	197.5	90	420.1-425	422.5

(3 of 3 sheets)

Table 7
Road Factors and Road Factor Classes Used to Describe Roads for Ground Mobility

ROAD FACTORS	Class Numbers										
	1	2	3	4	5	6	7	8	9	10	11
ROAD TYPE	Paved*	Secondary**	Trails								
SURFACE STRENGTH											
A. CI or RCI											
CLASS RANGE	>280	221-280	161-220	101-160	61-100						
VALUE SELECTED FOR PREDICTION	300	250	190	130	80						
SLOPE (%)											
CLASS RANGE	>0-2	2.1-5	5.1-7	7.1-10	10.1-14	14.1-20	20.1-27	27.1-35			
VALUE SELECTED FOR PREDICTION	>1	3.5	6.0	8.5	12.0	17.0	23.5	31.0			
SURFACE ROUGHNESS (RMS ELEV, in.)											
CLASS RANGE	0-.4	.5-1.5	1.6-2.5	2.6-3.5							
VALUE SELECTED FOR PREDICTION	.2	1	2	3							
CURVATURE (DEGREES)											
CLASS RANGE	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-15	15.1-20	20.1-30	30.1-40	40.1-60	60.1-80
VALUE SELECTED FOR PREDICTION	1	3	5	7	9	12.5	17.5	25	35	50	70

* Surface Strength not considered
Used 40-lb. per ton motion resistence

** Surface Strength not considered
Used 70-lb. per ton motion resistence

Table 8

Density of Road Networks in Study Areas and Road Lengths Used in Predictions

Area	Sample Size sq mi	Road Type	Length mi	Density mi per sq mi
West Germany	94	Primary	104	1.1
		Secondary	82	0.9
		Trails	589	6.3
		Total	775	8.3
Thailand	767	Primary	70	0.1
		Secondary	67	0.1
		Trails	277	0.4
		Total	414	0.6
Yuma, Arizona	501	Primary	84	0.2
		Secondary	87	0.2
		Trails	203	0.4
		Total	374	0.8

Table 7

Summary of Vehicle Characteristics and Some Performance Parameters

Item No.	Vehicle	Trailer/Howitzer	Vehicle Characteristics: Gross Vehicle Weight lb	Wheel Base in.	Horse-power per Ton (hpt)	Ground Clearance in.*	Approach Angle deg	Departure Angle deg	Wheel Spacing in.	Vehicle Performance: VCI_1 Fine Grained	VCI_1 Coarse Grained	Max Speed mph	Speeds for Obstacle Heights, 2.5 g: 2 in.	6 in.	10 in.	Speeds for RMS† Values, 6 watts: 1	2	3
	Category 1: 1/4-Ton Payload																	
1	M151A2, 1/4-ton, 4x4 utility truck	None	3,200	85	44.4	12.0	66	37	85	18.5	23.0	60	46	5.0	1.8	32	2.0	5.0
2	1/4-ton, 4x4 utility truck†	None	4,040	100	55.0	12.5	43	26	100	28.[illegible]	21.8	60	93	10.2	3.7	53	18.0	6.0
3	M151A2, 1/4-ton, 4x2 utility truck	None	3,200	85	44.4	12.0	66	37	85	26.0	50.0	60	46	5.0	1.8	32	5.0	5.0
4	1/4-ton, 4x2 utility truck†	None	4,040	100	55.0	12.5	43	26	100	37.0	53.0	60	93	10.2	3.7	53	18.0	6.0
5	M151A2, 1/4-ton, 4x4 utility truck	M416, 2-wheel, 1/4-ton cargo trailer	4,320	85	32.9	12.0	66	37	85	22.0	25.0	50	46	5.0	1.8	31	8.0	4.6
6	1/4-ton, 4x4 utility truck†	M416, 2-wheel, 1/4-ton cargo trailer	5,120	100	43.4	12.5	43	26	100	31.0	27.0	50	93	10.2	3.7	50	18.0	6.0
7	M151A2, 1/4-ton, 4x2 utility truck	M416, 2-wheel, 1/4-ton cargo trailer	4,320	85	32.9	12.0	66	37	85	29.0	69.0	50	46	5.0	1.8	31	8.0	4.6
8	1/4-ton, 4x2 utility truck†	M416, 2-wheel, 1/4-ton cargo trailer	5,120	100	43.4	12.5	43	26	100	38.0	69.0	50	93	10.2	3.7	50	18.0	6.0
	Category 2: 1/2-Ton Payload																	
9	M274A2, 1/2-ton, 4x4 platform utility truck	None	1,970	57	13.7	15.25	40	34	57	12.7	20.7	25	63	7.0	2.5	5.3	4.4	4.3
	Category 3: 3/4-Ton Payload																	
10	M37B1, 3/4-ton, 4x4 cargo truck	None	7,600	112	19.7	16.0	44	32	112	27.1	17.5	55	92	10.2	3.7	30.0	8.0	4.4
11	M37B1, 3/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	10,440	112	14.4	16.0	44	32	112	31.0	24.0	50	92	10.2	3.7	28.2	8.0	4.0
	Category 4: 1-1/4-Ton Payload																	
12	M715E1, 1-1/4 ton, 4x4 cargo truck†	None	8,400	126	27.6	15.5	45	25	126	29.1	16.9	50	>100	12.0	4.4	30.0	7.6	4.0
13	XM705, 1-1/4-ton, 4x4 cargo truck	None	8,766	132	35.5	15.4	61	45	132	27.9	15.1	50	92	23.0	6.3	25.0	7.0	5.5
14	M561, 1-1/4-ton, 6x6 cargo truck	None	6,960	81	25.0	15.8	62.5	45	81	18.4	13.7	55	67	7.5	2.7	25.0	14.0	5.0
15	1-1/4-ton, 4x4 cargo truck†	None	7,000	131	40.0	11.5	29.5	13	131	29.4	18.5	50	>100	15.9	5.7	38.0	7.0	4.0
16	M715E1, 1-1/4-ton, 4x2 cargo truck†	None	8,400	126	27.6	15.5	45	25	126	38.0	29.0	50	>100	12.0	4.4	30.0	7.6	4.0
17	1-1/4-ton, 4x2 cargo truck†	None	7,000	131	40.0	11.5	28.5	13	131	33.0	31.0	50	>100	15.9	5.7	38.0	7.0	4.0
18	M715E1, 1-1/4-ton, 4x4 cargo truck†	M101A1, 2-wheel, 3/4-ton cargo trailer	11,240	126	20.0	15.5	45	25	126	32.0	23.0	50	>100	12.1	4.4	28.6	6.2	4.9
19	XM705, 1-1/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	11,606	132	27.6	15.4	61	45	132	31.0	20.0	55	92	22.9	6.3	25.0	5.3	4.2
20	M561, 1-1/4-ton, 6x6 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	11,800	81	17.5	15.8	62	45	81	23.0	18.0	55	67	7.4	2.7	25.0	12.0	5.0
21	M561, 1-1/4-ton, 6x6 cargo truck	M102, 105mm, light howitzer	12,375	81	16.6	15.8	62	45	81	33.0	19.0	55	67	7.4	2.7	25.0	11.0	5.0
22	1-1/4-ton, 4x4 cargo truck†	M101A1, 2-wheel, 3/4-ton cargo trailer	9,840	131	29.5	11.5	28	13	131	33.0	26.0	60	>100	15.9	5.7	35.0	7.0	4.0
23	M715E1, 1-1/4-ton, 4x2 cargo truck†	M101A1, 2-wheel, 3/4-ton cargo trailer	11,210	126	20.0	15.5	45	25	126	44.0	41.0	50	>100	12.1	4.4	28.6	6.2	4.9
24	1-1/4-ton, 4x2 cargo truck†	M101A1, 2-wheel, 3/4-ton cargo trailer	9,840	131	25.5	11.5	28	13	131	41.0	49.0	60	>100	15.9	5.7	35.0	7.0	4.0
	Category 5: 2-1/2-Ton Payload																	
25	M35A2, 2-1/2-ton, 6x6 cargo truck	None	16,800	154	14.9	19.0	48	40	130	26.2	25.9	50	84	37.3	13.4	21.5	7.5	3.0
26	2-1/2-ton, 4x2 (151 in. WB) cargo truck†	None	14,520	151	18.0	13.0	36	25	151	41.0	25.0	60	>100	17.0	6.1	15.5	2.2	2.0
27	M35A2, 2-1/2-ton, 6x4 cargo truck	None	15,800	154	14.9	19.0	48	40	130	37.0	35.0	50	84	37.3	13.4	21.5	7.5	3.0
28	M35A2, 2-1/2-ton, 6x6 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	24,550	154	11.4	19.0	48	40	130	34.0	27.0	50	84	37.3	13.4	16.0	3.[illegible]	2.[illegible]
29	M35A2, 2-1/2-ton, 6x6 cargo truck	M102, 105mm, light howitzer	22,215	154	11.8	19.0	48	40	130	35.0	26.0	50	84	37.3	13.4	15.0	4.[illegible]	3.0
30	2-1/2-ton, 4x2 (151 in. WB) cargo truck†	M105A2, 2-wheel, 1-1/2-ton cargo trailer	20,270	151	13.0	13.0	36	25	151	44.0	39.0	50	>100	17.0	6.1	15.4	2.2	2.0
31	M35A2, 2-1/2-ton, 6x4 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	24,550	154	11.4	19.0	48	40	130	40.0	50.0	50	84	37.3	13.4	16.0	3.0	2.0
	Category 6: 5-Ton Payload																	
32	M813, 5-ton, 6x6 cargo truck	None	31,840	233	15.7	22.9	46	32.5	152	30.5	23.3	52	>100	34.0	12.2	12.5	5.0	2.5
33	M656, 5-ton, 8x8 cargo truck	None	25,195	148	16.6	20.0	55	64	90	19.2	17.3	50	80	8.9	3.2	19.5	14.0	8.0
34	5-ton, 4x4 cargo truck†	None	17,615	152	25.5	22.0	55.5	41.5	135	38.0	42.0	60	93	23.0	8.4	3.0	3.0	2.8
35	M813, 5-ton, 6x4 cargo truck	None	31,840	233	15.7	22.9	46	32.5	152	49.0	31.0	52	>100	34.0	12.2	12.5	5.0	2.5

(Continued)

* Minimum ground clearance between innermost wheels.
† See Addendum I for updates on ride speeds.

Table 3 (Concluded)

No.	Vehicle	Trailer Howitzer	Gross Vehicle Weight lb	Wheel Base in.	Horse-power per Ton (hpt)	Ground Clearance in.	Approach Angle deg	Departure Angle deg	Wheel Spacing in.	VCI1 Fine Grained	VCI1 Coarse Grained	Max Speed mph	Speeds for Obstacle Heights, 2.5 g: 2 in.	[illegible] in.	10 in.	Speeds for RMS Values, [illegible]: 1	2	3
	Category 6: 5-Ton Payload (Continued)																	
[illegible]	M[illegible], 5-ton, 6x6 cargo truck	M114A1, 155mm, howitzer	44,560	233	11.2	[illegible]	45	32.5	152	47.0	30.0	34	>100	34.0	12.2	12.7	3.0	2.0
[illegible]	M[illegible], 5-ton, 6x6 cargo truck	M114A1, 155mm, howitzer	37,68[illegible]	1[illegible]	11.1	20.0	55	[illegible]	[illegible]	37.0	25.0	50	50	8.9	3.2	18.5	[illegible]	[illegible]
35	5-ton, 6x4 cargo truck†	Trailer, gross towed load (12,700 lb)**	30,[illegible]	162	14.[illegible]	22.0	55.5	41.5	135	45.0	50.0	60	93	23.1	8.4	3.0	2.9	[illegible]
39	M813, 5-ton, 6x6 cargo truck	Trailer, gross towed load (12,700 lb)**	44,560	233	11.	22.9	46	32.5	152	54.0	[illegible]	50	>100	34.0	12.2	12.7	3.0	2.0
	Category 7: 8-Ton Payload																	
40	M520, 8-ton, 4x4 cargo truck	None	43,210	235	9.2	29.0	35	37	[illegible]	[illegible]	8.4	[illegible]	[illegible]	15.1	[illegible]	[illegible]	7.0	4.1
	Category 8: 5-Ton Tractor with 12-Ton, 4-Wheel Trailer																	
41	M52, 5-ton, 6x6 tractor truck	M127A1, 4-wheel, 12-ton, stake semitrailer	52,030	167	3.5	[illegible]	45	70	[illegible]	50.0	41.0	50	75	33	11.3	12.5	[illegible]	1.8
[illegible]	5-ton, 6x4, 152 in. wb tractor truck†	M127A1, 4-wheel, 12-ton semitrailer	51,850	152	9.2	24.0	[illegible]	[illegible]	[illegible]	41.0	[illegible]	50	90	43.5	13.7	3.3	2.2	1.8
[illegible]	5-ton, 6x4, 150 in. wb tractor truck†	M127A1, 4-wheel, 12-ton semitrailer	[illegible]	150	9.6	[illegible]	[illegible]	75	[illegible]	59.0	55.0	[illegible]	101	45	15.2	4.0	3.0	2.0
[illegible]	M52, 5-ton, 6x6 tractor truck	M127A1, low bed, 12-ton, 4-wheel semitrailer	[illegible]	167	8.5	13.0	45	70	[illegible]	53.0	[illegible]	50	75	33	[illegible]	12.5	3.6	1.8
	Category 9: 10-Ton Tractor with 2[illegible]-Ton, 4-Wheel Trailer																	
[illegible]	M123A1, [illegible] tractor truck	[illegible] semitrailer	[illegible]	182	[illegible]	25.5	[illegible]	[illegible]	[illegible]	55.0	[illegible]	30	[illegible]	[illegible]	2.3	3.9	1.0	2.2
[illegible]	[illegible] tractor truck†	[illegible]	[illegible]	182	[illegible]	25.0	[illegible]	[illegible]	[illegible]	45.0	[illegible]	[illegible]	[illegible]	5.1	1.8	2.4	[illegible]	2.2
	Category 10: [illegible]-Ton Tractor with 50-[illegible]-Ton Trailer																	
[illegible]	[illegible] truck	[illegible] trailer, [illegible]	[illegible]	[illegible]	[illegible]	17.5	30	60	[illegible]	[illegible]	[illegible]	35	39.4	[illegible]	[illegible]	6.0	[illegible]	[illegible]
[illegible]	[illegible] truck†	[illegible] trailer	[illegible]	[illegible]	[illegible].3	15.0	26	[illegible]	[illegible]	139	[illegible]	[illegible]	[illegible]	[illegible]	29	5.3	[illegible]	[illegible]
	Category 11: Tracked Vehicles																	
[illegible]	M113A1 armored, [illegible] tracked, personnel carrier	[illegible]	[illegible]	NA	17.2	[illegible]	70	30	NA	16	0	40	20	13.9	11.7	16.0	[illegible]	[illegible]
[illegible]	M[illegible], full-tracked, [illegible] carrier	[illegible]	[illegible]	NA	[illegible]	[illegible]	57	[illegible]	NA	16.4	0	10	34.4	[illegible]	1.4	15.0	6.3	3.5
[illegible]	M60A[illegible], [illegible] gun, full-tracked combat tank	None	[illegible]	NA	1[illegible].2	NA	30	53	NA	19.7	0	30	94	37.3	13.4	16.8	9.4	8.1
	Category 12: Other Vehicles																	
[illegible]	M38A1, 1/4-ton, [illegible] truck	None	[illegible]	[illegible]	[illegible]	12.75	[illegible]	34	61	20.0	29.8	[illegible]	70.1	7.3	2.8	12.0	6.0	5.0
[illegible]	M151A1, 1/4-ton, [illegible] truck	None	[illegible]	[illegible]	[illegible]	12.0	64	37	85	18.5	23.0	60	46.0	5.0	1.8	19.5	7.6	6.0
[illegible]	[illegible], [illegible] truck	None	[illegible]	177.6	[illegible]	20.0	50	70	77	15.5	2[illegible].2	55	>100	38.[illegible]	13.8	50.0	20.0	14.0

[55-57, see Addendum III].

** M114A1, 155mm howitzer used in lieu of trailer.

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Table 11

Summary of Vehicle Speed Predictions

Item No.	Vehicle	Trailer/Howitzer	West Germany Speed, mph Off Road A-1 V_{100}	West Germany Off Road Areal Only V_{100}	West Germany Areal Only V_{90}	West Germany On Road V_3	West Germany On Road V_2	West Germany On Road V_1	West Germany Percent Go Off Road V_{100}	West Germany Percent Go On Road Class 3 V_3	Thailand Speed, mph Off-Road Areal Only V_{100}	Thailand Off-Road Areal Only V_{90}	Thailand On Road V_3	Thailand On Road V_2	Thailand On Road V_1	Thailand Percent Go Off Road	Thailand Percent Go On Road Class 3	Arizona Speed, mph Off-Road Areal Only V_{100}	Arizona Off-Road Areal Only V_{90}	Arizona On Road V_3	Arizona On Road V_2	Arizona On Road V_1	Arizona Percent Go Off Road	Arizona Percent Go On Road Class 3
									Category 1: 1/4-Ton Payload															
1	M151A2, 1/4-ton, 4x4 utility truck	None	2.1	4.8	7.9	9.1	34.1	39.0	99.4	100	0.1	0.1	9.4	37.0	57.8	25.1	100	3.0	4.7	9.6	34.5	48.5	99.2	100
2	1/4-ton, 4x4 utility truck (100 in. WB)**	↓	1.8	4.8	11.4	11.7	34.4	39.0	99.0	100	0.1	0.1	15.2	49.2	57.8	24.3	100	0.2	0.3	15.9	44.8	48.5	2.5	100
3	M151A2, 1/4-ton, 4x2 utility truck	↓	1.1	1.7	7.3	7.9	34.1	39.0	96.7	99.8	0.1	0.1	9.4	37.0	57.8	21.1	100	1.5	4.4	9.6	34.5	48.5	95.8	100
4	1/4-ton, 4x2 utility truck**	↓	0.7	1.0	8.2	9.7	34.4	39.0	90.9	99.5	0.1	0.1	15.2	49.2	57.8	9.7	100	0.2	0.3	15.9	44.8	48.5	61.1	100
5	M151A2, 1/4-ton, 4x4 utility truck	M416, 2-wheel, 1/4-ton cargo trailer	1.1	1.8	7.4	8.7	30.4	35.9	96.0	100	0.1	0.1	9.2	34.6	48.7	23.9	100	1.4	3.4	9.4	32.5	42.5	95.6	100
6	1/4-ton, 4x4 utility truck (100 in. WB)**	↓	1.6	4.6	10.9	11.5	32.	35.9	99.0	100	0.1	0.1	15.2	45.1	48.7	21.4	100	0.2	0.3	15.9	41.4	42.5	61.2	100
7	M151A2, 1/4-ton, 4x2 utility truck	↓	0.4	0.5	1.0	5.9	15.9	35.9	82.0	99.4	0.1	0.1	9.2	34.6	48.7	18.7	100	0.9	2.3	9.4	32.5	42.5	91.5	100
8	1/4-ton, 4x2 utility truck**	↓	0.4	0.5	0.5	7.0	14.5	35.9	79.1	99.4	0.1	0.1	15.2	45.1	48.7	9.8	100	0.2	0.3	15.9	41.4	42.5	79.4	100
									Category 2: 1/2-Ton Payload															
9	M274A2, 1/2-ton, 4x4 platform utility truck	None	1.4	4.1	5.3	5.6	10.6	22.8	99.6	100	0.1	0.1	5.1	7.8	24.8	21.0	100	3.3	4.7	4.3	7.7	23.7	99.2	100
									Category 3: 3/4-Ton Payload															
10	M37B1, 3/4-ton, 4x4 cargo truck	None	2.9	5.0	6.1	8.5	25.4	37.6	99.4	100	1.5	3.9	9.2	32.9	53.3	95.8	100	3.5	4.7	9.4	31.0	45.6	99.7	100
11	M37B1, 3/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	2.3	4.1	7.3	7.9	24.6	37.6	99.1	100	0.5	1.1	8.7	28.8	53.3	61.6	100	1.6	4.2	8.9	27.5	45.6	96.3	100
									Category 4: 1-1/4-Ton Payload															
12	M715E1, 1-1/4-ton, 4x4 cargo truck**	None	1.9	4.9	7.6	8.0	30.4	39.0	99.1	100	0.5	1.4	8.6	34.1	57.8	32.4	100	2.9	4.4	7.7	32.1	48.5	34.2	100
13	XM705, 1-1/4-ton, 4x4 cargo truck	↓	2.4	5.1	6.8	9.1	30.4	39.0	99.3	100	1.7	5.9	8.7	31.3	57.8	96.5	100	0.5	4.8	8.8	29.6	48.5	99.7	100
14	M561, 1-1/4-ton, 6x6 cargo truck	↓	5.6	5.7	10.3	10.0	29.0	37.6	99.4	100	1.4	3.1	12.5	30.7	53.3	96.2	100	2.8	3.6	12.0	29.2	45.6	99.7	100
15	1-1/4-ton, 4x4 cargo truck**	↓	1.4	3.8	7.5	7.8	33.1	39.0	99.0	100	0.1	0.1	7.3	40.9	57.8	20.2	100	0.2	0.3	8.4	37.8	48.5	60.4	100
16	M715E1, 1-1/4-ton, 4x2 cargo truck**	↓	0.9	1.1	6.7	8.0	30.4	35.9	92.8	100	0.1	0.1	6.6	34.1	57.8	57.3	100	1.5	4.2	8.7	32.1	48.5	95.8	100
17	1-1/4-ton, 4x2 cargo truck**	↓	0.7	1.1	6.1	7.8	33.1	39.0	92.6	100	0.1	0.1	6.2	40.9	57.8	12.0	100	0.2	0.2	8.4	37.8	48.5	59.0	100
18	M715E1, 1-1/4-ton, 4x4 cargo truck**	M101A1, 2-wheel, 3/4-ton cargo trailer	1.7	3.2	5.9	6.1	28.2	37.6	99.1	100	0.5	0.9	6.9	31.6	53.3	80.9	100	1.5	4.4	6.0	30.0	45.6	95.8	100
19	XM705, 1-1/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	1.9	3.0	6.4	7.2	29.4	37.6	99.0	100	0.5	1.2	6.6	30.7	53.3	81.6	100	1.4	3.2	6.9	29.1	45.6	96.3	100
20	M561, 1-1/4-ton, 6x6 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	3.0	4.7	8.9	9.7	27.2	37.1	99.4	100	1.3	3.1	11.7	29.1	53.3	95.6	100	2.8	3.5	11.7	27.8	45.6	99.7	100
21	M561, 1-1/4-ton, 6x6 cargo truck	M102, 105mm, light howitzer	2.5	3.6	8.3	9.6	27.2	37.6	96.8	100	0.4	0.7	11.2	29.1	53.3	80.2	100	2.9	3.5	11.3	27.8	45.6	99.7	100
22	1-1/4-ton, 4x4 cargo truck**	M101A1, 2-wheel, 3/4-ton cargo trailer	0.7	1.1	6.4	7.8	31.8	37.6	93.5	100	0.1	0.1	5.2	39.7	53.3	19.5	100	0.2	0.2	8.4	36.8	45.6	59.1	100
23	M715E1, 1-1/4-ton, 4x2 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0.7	0.9	3.9	7.1	28.2	37.6	90.9	99.8	0.1	0.1	7.8	31.6	53.3	18.5	100	1.5	4.3	6.0	30.0	45.6	95.8	100
24	1-1/4-ton, 4x2 cargo truck**	M101A1, 2-wheel, 3/4-ton cargo trailer	0.6	0.9	5.5	6.9	31.8	37.6	90.9	99.8	0.1	0.1	8.2	39.7	53.3	11.0	100	0.2	0.2	8.4	36.8	45.6	57.8	100
									Category 5: 2-1/2-Ton Payload															
25	M35A2, 2-1/2-ton, 6x6 cargo truck	None	2.7	4.3	6.6	6.6	25.5	35.9	99.4	100	1.7	5.2	7.8	25.2	48.7	96.2	100	3.2	4.2	7.7	24.2	42.5	99.7	100
26	2-1/2-ton, 4x2 (151 in. WB) cargo truck**	None	0.5	0.6	1.3	3.4	23.3	34.2	51.5	100	0.1	0.1	3.0	20.7	49.7	12.4	100	0.2	0.2	3.0	20.2	43.1	50.6	100
27	M35A2, 2-1/2-ton, 6x4 cargo truck	None	0.9	1.1	5.9	5.6	25.5	35.9	32.8	100	0.1	0.1	7.8	25.2	48.7	19.9	100	0.9	3.8	7.7	24.2	42.5	92.0	100
28	M35A2, 2-1/2-ton, 6x6 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	1.1	1.3	3.5	3.9	21.4	35.9	35.4	100	0.5	1.0	3.8	23.0	48.7	81.3	100	0.9	2.9	3.8	19.6	42.5	92.0	100
29	M35A2, 2-1/2-ton, 6x6 cargo truck	M102, 105mm, light howitzer	1.2	1.5	4.7	5.3	21.3	35.9	95.4	100	0.4	0.7	5.0	19.8	48.7	79.8	100	1.0	4.3	5.0	19.2	42.5	92.1	100
30	2-1/2-ton, 4x2 (151 in. WB) cargo truck**	M105A2, 2-wheel, 1-1/2-ton cargo trailer	1.2	0.3	0.4	3.2	21.2	35.9	72.0	99.6	0.1	0.1	3.0	19.4	48.7	11.2	100	0.2	0.2	3.0	19.3	42.5	49.7	100
31	M35A2, 2-1/2-ton, 6x4 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	0.7	0.8	3.2	3.6	20.5	35.9	92.0	99.8	0.1	0.1	3.8	19.4	48.7	19.5	100	0.9	2.9	3.8	19.1	42.5	92.0	100
									Category 6: 5-Ton Payload															
32	M813, 5-ton, 6x6 cargo truck	None	2.4	3.3	5.2	5.2	21.0	35.9	95.2	100	0.6	1.9	5.5	17.5	48.7	83.9	100	2.4	2.9	5.4	17.2	42.5	99.7	100
33	M656, 5-ton, 8x8 cargo truck	↓	5.6	6.6	11.9	12.2	24.0	35.9	99.4	100	1.7	3.4	13.7	25.3	48.7	97.0	100	4.1	5.4	13.7	24.3	42.5	99.7	100
34	5-ton, 6x4 cargo truck**	↓	0.9	1.4	3.1	3.7	7.3	34.3	96.3	100	0.1	0.1	3.3	4.8	45.0	21.5	100	1.5	3.3	3.0	4.7	39.6	96.3	100
35	M813, 5-ton, 6x4 cargo truck	↓	0.3	0.3	0.5	5.2	21.0	35.9	72.0	100	0.1	0.1	5.5	17.5	48.7	20.0	100	1.0	2.8	5.4	17.2	42.5	93.7	100

(Continued)

** See Addendum I for revised V_{90} and V_2 estimates.

Table 10 (Concluded)

Item No.	Vehicle	Trailer Howitzer	West Germany Speed, mph Off-Road R = 1 V_{100}	West Germany Speed, mph Off-Road Areal Only V_{100}	West Germany Speed, mph Off-Road Areal Only V_{90}	West Germany Speed, mph On Road V_3	West Germany Speed, mph On Road V_2	West Germany Speed, mph On Road V_1	West Germany Percent Go Off Road V_{100}	West Germany Percent Go On Road Class 3	Thailand Speed, mph Off-Road Areal Only V_{100}	Thailand Speed, mph Off-Road Areal Only V_{90}	Thailand Speed, mph On Road V_3	Thailand Speed, mph On Road V_2	Thailand Speed, mph On Road V_1	Thailand Percent Go Off Road	Thailand Percent Go On Road Class 3	Arizona Speed, mph Off-Road Areal Only V_{100}	Arizona Speed, mph Off-Road Areal Only V_{90}	Arizona Speed, mph On Road V_3	Arizona Speed, mph On Road V_2	Arizona Speed, mph On Road V_1	Arizona Percent Go Off Road	Arizona Percent Go On Road Class 3
							Category 7: 5-Ton Payload (Continued)																	
36	M813, 5-ton, 6x6 cargo truck	M114A1, 155mm howitzer	0.5	1.5	1.2	3.8	19.3	35.9	94.5	100	0.1	0.1	3.7	15.8	48.7	20.1	100	1.4	3.1	3.7	16.6	42.5	96.3	100
37	M656, 5-ton, 8x8 cargo truck	M114A1, 155mm howitzer	1.0	1.2	10.0	10.8	21.6	35.9	92.8	100	0.1	0.1	15.2	22.0	45.7	20.2	100	1.9	6.6	12.5	21.4	42.5	96.3	100
38	5-ton, 6x6 cargo truck**	Trailer, gross towed load (12,700 lb)*	0.3	0.3	0.4	2.6	5.3	31.6	72.8	99.4	0.1	0.1	2.8	4.2	38.4	19.0	100	0.8	2.5	2.5	4.1	34.8	92.0	100
39	M813, 5-ton, 6x6 cargo truck	Trailer, gross towed load (12,700 lb)*	0.2	0.2	0.2	3.6	13.2	35.9	55.4	95.8	0.1	0.1	3.7	15.8	48.7	12.7	100	0.9	3.0	3.7	16.6	42.5	92.0	100
							Category 7: 8-Ton Payload																	
40	M520E1, 8-ton, 4x4 cargo truck	None	0.6	3.4	6.0	7.3	20.3	26.2	99.3	100	0.9	1.5	7.7	23.8	29.7	54.0	100	3.3	3.9	8.4	23.1	27.8	99.7	100
							Category 8: 5-Ton Tractor with 12-Ton, 4-Wheel Trailer																	
41	M818, 5-ton, 6x6 tractor truck	M127A1C, 4-wheel, 12-ton stake semitrailer	0.2	0.2	0.2	3.5	20.5	35.9	55.4	98.3	0.1	0.1	4.0	16.9	48.7	12.7	100	0.8	2.4	4.1	16.7	42.5	92.0	100
42	5-ton, 6x4 (152 in. WB) tractor truck**	M127A1C, 4-wheel, 12-ton semitrailer	0.1	0.1	0.1	1.2	5.2	35.9	25.9	94.7	0.1	0.1	2.7	5.8	45.7	8.5	100	0.8	2.1	2.5	5.7	42.5	92.0	100
43	5-ton, 6x4 (150 in. WB) tractor truck**	M127A1C, 4-wheel, 12-ton semitrailer	0.3	0.3	0.4	3.2	9.1	35.9	72.8	99.8	0.1	0.1	3.4	6.3	48.7	19.0	100	0.9	2.6	3.2	6.1	42.5	92.0	100
44	M818, 5-ton, 6x6 tractor truck	M127A1C, 4-wheel, 25-ton, low-bed semitrailer	0.2	0.2	0.2	3.1	20.3	35.9	43.8	75.4	0.1	0.1	3.9	15.9	48.7	12.2	100	0.8	2.4	4.1	16.7	42.5	92.0	100
							Category 9: 10-Ton Tractor with 25-Ton, 4-Wheel Trailer																	
45	M123A1C, 10-ton, 6x6 tractor truck	M172A1, 4-wheel, 25-ton, low-bed semitrailer	0.2	0.2	0.2	0.5	7.9	26.2	54.3	80.7	0.1	0.1	0.1	5.5	29.7	0.0	0.6	0.9	1.4	3.4	5.7	27.8	96.3	100
46	10-ton, 6x4 (132 in. WB) tractor truck**	M172A1, 4-wheel, 25-ton, low-bed semitrailer	0.2	0.2	0.2	0.4	5.8	26.2	42.7	80.7	0.1	0.1	0.1	3.8	29.7	0.0	0.6	0.8	2.4	2.4	3.8	27.8	92.0	100
							Category 10: 22-1/2-Ton Tractor with 52-1/2-Ton Trailer																	
47	M746, 22-1/2-ton, 8x8 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment transporter, low-bed semitrailer	0.2	0.2	0.2	4.2	11.6	29.7	43.7	98.8	0.1	0.1	4.3	8.7	35.5	11.2	100	0.9	3.0	4.4	8.5	32.5	92.0	100
48	22-1/2-ton, 8x4 tractor truck**	M747, 8-wheel, 52-1/2 ton, heavy equipment transporter, low-bed semitrailer	0.1	0.1	0.1	0.1	11.5	29.7	0.0	21.9	0.1	0.1	0.1	8.9	35.5	0.0	0.0	1.0	4.3	4.8	8.7	29.0	92.0	100
							Category 11: Reference Tracked Vehicles																	
49	M113A1, armored, full-tracked, personnel carrier	None	6.7	6.5	10.1	11.3	23.2	30.4	99.7	100	3.2	6.8	10.9	21.7	40.4	98.4	100	5.9	6.4	10.9	21.1	36.1	100	100
50	M548, full-tracked, cargo carrier	None	—	4.7	6.2	6.7	21.8	30.4	99.9	100	1.4	1.8	7.1	19.6	36.9	98.3	100	1.2	1.4	7.0	19.2	33.7	100	100
51	M60A1, 105-mm gun, full-tracked combat tank	None	—	6.6	8.3	10.6	18.0	26.2	100	100	6.6	7.1	10.6	18.1	29.7	100	100	6.4	7.0	10.8	17.9	27.8	100	100
							Category 12: Reference Wheeled Vehicles																	
52	M38A1, 1/4-ton, 4x4 utility truck	None	—	4.8	7.2	7.7	22.0	39.0	99.5	100	0.2	0.2	7.2	17.7	57.8	42.1	100	3.4	4.5	7.1	17.5	48.5	99.7	100
53	M151A1, 1/4-ton, 4x4 utility truck	None	—	5.5	9.6	9.1	32.1	39.0	99.6	100	0.1	0.1	9.4	37.0	57.8	25.0	100	3.3	5.4	9.6	34.5	48.5	99.1	100
54	XM410, 2-1/2-ton, 8x8 cargo truck	None	—	8.0	16.0	16.1	31.6	35.9	99.7	100	2.0	7.4	19.1	45.0	48.7	96.2	100	8.1	14.1	20.7	41.2	42.5	99.6	100
							Category 13: Additional Vehicles																	
55	1/4-ton, 4x4 utility truck (85 in. WB)	None		4.6	7.4	8.1	24.4	39.0	99.4	100	0.1	0.1	7.7	20.1	57.8	25.1	100	5.0	6.4	7.6	19.6	48.5	99.7	100
56	Experimental 5- to 8-ton, 8x8 cargo truck	None		7.7	12.4	13.5	25.0	35.5	99.7	100	3.0	4.1	16.6	32.3	53.2	99.1	100	3.5	4.3	19.3	29.7	45.4	99.7	100
57	22-1/2-ton, 8x6 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment transporter, low-bed semitrailer		0.2	0.2	0.5	8.5	26.9	42.8	80.3	0.1	0.1	0.1	10.1	34.9	0	0.6	1.6	3.6	4.6	9.9	32.0	96.3	100

* M114A1, 155mm howitzer used in lieu of trailer.

Factors Co

Item No.	Vehicle	Trailer/Howitzer	1*	2
1	M151A2, 1/4-ton, 4x4 utility truck	None	0	0.
2	1/4-ton, 4x4 utility truck	↓	0	0.
3	M151A2, 1/4-ton, 4x2 utility truck	↓	0	4.
4	1/4-ton, 4x2 utility truck	↓	3.4	5.
5	M151A2, 1/4-ton, 4x4 utility truck	M416, 2-wheel, 1/4-ton cargo trailer	0	0.
6	1/4-ton, 4x4 utility truck	↓	0	0.
7	M151A2, 1/4-ton, 4x2 utility truck	↓	0	17.
8	1/4-ton, 4x2 utility truck	↓	3.4	17.
9	M274A2, 1/2-ton, 4x4 platform utility truck	None	0	0.
10	M37B1, 3/4-ton, 4x4 cargo truck	None	0	0.
11	M37B1, 3/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0	0.
12	M715E1, 1-1/4-ton, 4x4 cargo truck	None	0	0.
13	XM705, 1-1/4-ton, 4x4 cargo truck	↓	0	0.
14	M561, 1-1/4-ton, 6x6 cargo truck	↓	0	0.
15	1-1/4-ton, 4x4 cargo truck	↓	0	0.
16	M715E1, 1-1/4-ton, 4x2 cargo truck	↓	3.4	3.
17	1-1/4-ton, 4x2 cargo truck	↓	3.4	3.
18	M715E1, 1-1/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0	0.
19	XM705, 1-1/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0	0.
20	M561, 1-1/4-ton, 6x6 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0	0.
21	M561, 1-1/4-ton, 6x6 cargo truck	M105, 155mm, light howitzer	0	1.
22	1-1/4-ton, 4x4 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	0	[illegible]
23	M715E1, 1-1/4-ton, 4x2 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	3.4	5.
24	1-1/4-ton, 4x2 cargo truck	M101A1, 2-wheel, 3/4-ton cargo trailer	3.4	5.

Note:

Legend

	Factors Controlling	Description
Go-no go	1	Surface strength < minimum required for one pass
	2	Traction available < surface and slope resistances
	3	Obstacle interference
	4	Traction available < surface, slope, obstacle, and vegetation resistances
Speed	5	Ride dynamics
	6	Surface and slope resistances
	7	Visibility
	8	Maneuver
	9	Surface, slope, obstacle, and vegetation resistances
	10	Acceleration and deceleration between obstacles

* Factors controlling speed.

A

Table 11

Factors Controlling Predicted Speed in Areal Terrain Units (V_{100})

Trailer/Howitzer	West Germany 1*	2	3	4	5	6	7	8	9	10	Percent Traverse… Thaila… 1	2	3	4	5
Category 1: 1/4-Ton Payload															
None	0	0.4	0.2	0	52.0	8.0	13.3	24.9	0.4	0.9	0	0	72.5	2.5	5.2
	0	[illegible]	0.3	0	46.2	6.0	20.8	24.9	2.5	0.7	0	0	72.5	3.2	1.2
	0	4.1	0.2	0	50.1	[illegible]	13.7	22.7	2.2	0.9	0	1.3	72.5	5.1	4.1
	[illegible]	[illegible]	[illegible]	0	42.4	4.1	[illegible]	22.7	1.5	0.5	78.4	1.2	[illegible]	3.2	0.7
M416, 2-wheel, 1/4-ton cargo trailer	0	0.5	0.2	[illegible]	44.5	[illegible]	0.2	22.7	0.3	0.9	0	1.2	72.5	2.4	4.6
	0	[illegible]	0.2	0	68.3	3.3	0.6	25.0	1.4	0.4	14.4	0.1	61.5	2.7	1.5
	0	[illegible]	0.2	0	52.0	4.5	3.1	17.0	4.1	0.9	14.4	2.0	61.5	3.4	2.4
	[illegible]	[illegible]	0.3	0.1	[illegible]	1.3	3.1	[illegible]	2.5	0.4	78.4	2.0	7.4	2.3	1.1
Category 2: 1/2-Ton Payload															
None	0	0.2	0.3	0	[illegible]	15.0	0.1	[illegible]	0.5	0.3	0	0	73.9	5.1	10.4
Category 3: 3/4-Ton Payload															
None	0	0.4	0.2	0	[illegible]	18.6	6.4	[illegible]	1.5	0.7	0	0	1.7	2.5	5.6
M1[illegible], 2-wheel, [illegible]/4-ton cargo trailer	0	[illegible]	0.2	0	50.4	22.1	0.9	23.8	1.1	0.8	14.4	1.4	1.7	0.9	4.5
Category 4: 1-1/4-Ton Payload															
None	0	[illegible]	0.2	0	[illegible]	17.0	[illegible]	24.0	1.6	0.6	0	0	1.7	15.9	3.5
	0	0.4	0.2	0	51.5	[illegible]	[illegible]	24.9	4.2	0.5	0	0	2.7	2.5	6.9
	0	0.4	0.2	0	50.2	12.1	[illegible]	24.8	2.2	1.0	0	0	2.0	1.8	0.7
	0	[illegible]	0.4	0	49.2	12.3	9.7	26.2	1.3	0.2	14.4	0	63.0	2.4	3.4
	2.4	[illegible]	0.2	0	47.5	10.1	9.0	21.8	3.7	0.6	78.4	1.2	7.5	0.5	1.9
	2.4	[illegible]	0.4	0	42.7	[illegible]	14.4	24.0	5.6	0.2	[illegible]	1.2	7.9	0.5	2.5
M1[illegible]A1, 2-wheel, [illegible]/4-ton cargo trailer	0	0.7	0.2	0	[illegible]	[illegible]	0.5	23.1	2.5	0.6	14.4	0.1	1.7	3.0	3.2
M1[illegible], 2-wheel, [illegible]/4-ton cargo trailer	0	[illegible]	[illegible]	0	[illegible]	10.3	0.5	24.4	4.0	0.5	14.4	0.1	1.7	2.3	9.8
M1[illegible]A[illegible], 2-wheel, [illegible]/4-ton cargo trailer	0	0.4	0.2	0	54.5	18.0	0.5	24.7	0.8	0.9	0	[illegible]	2.0	2.3	0.7
M1[illegible], [illegible] mm, light howitzer	0	1.0	0.2	0	44.1	23.9	4.2	24.6	1.1	0.8	14.4	1.4	2.0	2.0	0.7
M1[illegible], 2-wheel, [illegible]/4-ton cargo trailer	0	[illegible]	0.4	0	46.3	13.3	9.3	22.9	1.4	0.2	14.4	1.2	63.0	1.9	3.1
M1[illegible], 2-wheel, [illegible]/4-ton cargo trailer	2.4	[illegible]	0.2	0.1	50.5	13.8	1.3	22.7	2.1	0.5	78.4	1.4	0	1.6	[illegible]
M1[illegible], 2-wheel, [illegible]/4-ton cargo trailer	2.4	[illegible]	0.4	0	42.0	11.1	[illegible]	[illegible]	1.0	0.2	78.4	1.2	7.9	1.4	[illegible]

(Continued)

…scription
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…surface, slope, obstacle, and …s
…stances
…le, and vegetation
…ration between obstacles

B

...s (V_{100})

Percent Traverse Distance																			
Thailand										Arizona									
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0	0	72.5	2.5	5.2	0.1	16.5	1.3	0.4	1.6	0	0.3	0.5	0	23.5	0.3	1.3	3.7	0	70.5
0	0	72.5	3.2	1.2	0	19.3	1.7	0.6	1.5	0	0.2	37.3	0	20.2	0.3	2.1	40.0	0	0
0	1.3	72.5	5.1	4.1	0	14.6	0.6	0.4	1.4	0	3.7	0.5	0	22.5	0	1.6	3.6	0	68.1
78.4	1.2	7.4	3.2	0.7	0	8.5	0.1	0	0.4	0	1.5	37.3	0	20.0	0	1.6	39.6	0	0
0	1.2	72.5	2.4	4.6	0	15.8	1.3	0.6	1.6	0	3.7	0.5	0	25.6	0	1.2	3.6	0	65.4
14.4	0.1	61.5	2.7	1.5	0	17.2	1.2	0.1	1.4	0	1.5	37.3	0	20.5	0	1.1	39.6	0	0
14.4	2.0	61.5	3.4	2.4	0	14.2	0.3	0.3	1.4	0	8.0	0.5	0	23.6	0	1.5	3.6	0	62.8
78.4	2.0	7.4	2.3	1.1	0	8.1	0.2	0	0.4	0	3.3	37.3	0	19.4	0	1.5	38.5	0	0
0	0	73.9	5.1	10.4	0	6.2	0.3	4.0	0	0	0.3	0.5	0	23.7	1.0	0.2	1.6	0	72.7
0	0	1.7	2.5	5.6	0.3	14.6	0.4	3.0	72.0	0	0.3	0	0	34.7	0.7	0.9	0.2	0	63.3
14.4	1.4	1.7	0.9	4.5	0.3	13.9	0.2	1.6	61.0	0	3.7	0	0	31.8	0.4	1.2	0.2	0	62.8
0	0	1.7	15.9	3.5	0.2	13.9	2.9	3.7	61.3	0	0.3	0.5	0	33.9	0.3	0.7	4.1	0	60.3
0	0	2.7	2.5	6.9	0	15.3	3.4	0.9	69.2	0	0.3	0	0	41.6	0.2	0.7	3.6	0	53.5
0	0	2.0	1.8	0.7	0.2	18.9	3.4	1.5	72.2	0	0.3	0	0	32.7	0.3	0.7	0.6	0	65.4
14.4	0	63.0	2.4	3.4	0	13.9	2.6	0.3	0	0	0.2	37.3	0	20.2	0	1.8	40.2	0.2	0
78.4	1.2	7.5	0.5	1.9	0	7.1	2.6	0.2	0.5	0	3.7	0.5	0	30.7	0	1.3	4.0	0	59.8
78.4	1.2	7.9	0.5	2.5	0	6.9	2.4	0.1	0	0	1.5	37.3	0	20.0	0	1.4	39.8	0	0
14.4	0.1	1.7	3.0	3.2	0	13.3	2.7	1.0	60.8	0	3.7	0.5	0	31.1	0	1.0	4.0	0	59.8
14.4	0.1	1.7	2.3	9.8	0	11.9	3.1	0.5	56.3	0	1.5	2.1	0	48.7	0	0.6	3.0	0	43.4
0	0.1	2.0	2.3	0.7	2.0	15.5	2.8	2.6	72.1	0	0.3	0	0	30.9	0.3	0.2	3.6	0	67.7
14.4	1.4	2.0	2.0	0.7	1.6	10.1	2.7	5.0	60.0	0	0.3	0	0	31.1	0.2	0.7	0.6	0	67.0
14.4	1.2	63.0	1.9	3.1	0.1	13.4	2.7	0.2	0	0	1.5	37.3	0	20.0	0	1.3	39.8	0	0
78.4	1.4	0	1.6	2.0	0	6.4	2.3	0.5	0.5	0	3.7	0.5	0	30.6	0	1.3	4.0	0	59.8
78.4	1.2	7.9	1.4	2.3	0	6.5	2.1	0.2	0	0	3.3	37.3	0	19.4	0	1.3	38.7	0	0

B

C

Item No.	Vehicle	Trailer/Howitzer	1	2	3
25	M35A2, 2-1/2-ton, 6x6 cargo truck	None	0	0.4	0.2
26	2-1/2-ton, 4x2 (151 in. WB) cargo truck	None	3.4	5.3	0.3
27	M35A2, 2-1/2-ton, 6x4 cargo truck	None	3.4	3.6	0.2
28	M35A2, 2-1/2-ton, 6x6 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	0	4.4	0.2
29	M35A2, 2-1/2-ton, 6x6 cargo truck	M102, 105mm, light howitzer	0	1.0	0.2
30	2-1/2-ton, 4x2 (151 in. WB) cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	3.4	23.5	0.3
31	M35A2, 2-1/2-ton, 6x4 cargo truck	M105A2, 2-wheel, 1-1/2-ton cargo trailer	3.4	5.3	0.2
32	M813, 5-ton, 6x6 cargo truck	None	0	0.7	0.1
33	M656, 5-ton, 8x8 cargo truck	↓	0	0.4	0.2
34	5-ton, 6x4 cargo truck	↓	3.4	0.1	0.2
35	M818, 5-ton, 6x4 cargo truck	↓	3.4	24.5	0.1
36	M813, 5-ton, 6x6 cargo truck	M114A1, 155mm, howitzer	3.4	11.9	0.1
37	M656, 5-ton, 8x8 cargo truck	M114A1, 155mm, howitzer	3.4	3.6	0.2
38	5-ton, 6x4 cargo truck	Trailer, gross towed load (12,700 lb)**	3.4	23.5	0.2
39	M813, 5-ton, 6x4 cargo truck	Trailer, gross towed load (12,700 lb)**	41.0	3.5	0
40	M520E1, 8-ton, 4x4 cargo truck	None	0	0.9	0
			Category 8		
41	M818, 5-ton, 6x6 tractor truck	M127A1C, 4-wheel, 12-ton, stake semitrailer	41.0	3.5	0
42	5-ton, 6x4 (152 in. WB) tractor truck	M127A1C, 4-wheel, 12-ton semitrailer	3.4	70.5	0.1
43	5-ton, 6x4 (150 in. WB) tractor truck	M127A1C, 4-wheel, 12-ton semitrailer	3.4	23.5	0.2
44	M818, 5-ton, 6x4 tractor truck	M127A1C, 4-wheel, 25-ton, low-bed semitrailer	41.0	15.2	0
			Category 9:		
45	M123A1C, 10-ton, 6x6 tractor truck	M172A1, 4-wheel, 25-ton, low-bed semitrailer	42.1	3.5	0.1
46	10-ton, 6x4 (182 in. WB) tractor truck	M172A1, 4-wheel, 25-ton, low-bed semitrailer	42.1	15.1	0.1
			Category 10		
47	XM746, 22-1/2-ton, 8x8 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment transporter, low-bed semitrailer	41.0	15.2	0
48	22-1/2-ton, 8x4 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment transporter, low-bed semitrailer	100.0	0	0
49	M113A1, armored, full-tracked, personnel carrier	None	0	0.1	0.2
50	M548E1, full-tracked, cargo carrier	None	0	0.1	0.2
51	M60A1, 105-mm gun, full-tracked, combat tank	None	0	0.1	0
52	M38A1, 1/4-ton, 4x4 utility truck	None	0	0.4	0.1
53	M151A1, 1/4-ton, 4x4 utility truck	None	0	0.4	0.2
54	XM410, 2-1/2-ton, 8x8 cargo truck	None	0	0.4	0.2
55	1/4-ton, 4x4 utility truck (85 in. WB)	None	0	0.4	0.1
56	Experimental, 5- to 8-ton, 8x8 cargo truck	None	0	0.4	0
57	22-1/2-ton, 8x6 tractor truck	M747, 8-wheel, 52-1/2-ton heavy equipment transporter, low-bed semitrailer	42.1	15.1	0

** M114A1, 155 mm howitzer used in lieu of trailer.

Table 11 (Concluded)

/Howitzer	West Germany 1	2	3	4	5	6	7	8	9	10	Percent Traverse D… Thailand 1	2	3	4	5
Category 5: 2-1/2-Ton Payload															
lone	0	0.4	0.2	0	49.7	16.1	6.4	18.9	8.0	0.4	0	0	2.0	1.8	34.0
lone	3.4	5.3	0.3	5.1	48.0	15.4	3.6	17.5	0.8	0.4	78.4	1.2	7.5	0.5	3.9
lone	3.4	3.6	0.2	0	47.5	18.3	4.1	20.7	2.0	0.4	78.4	1.4	0	0.3	6.5
2-ton cargo trailer	0	4.4	0.2	0	52.3	19.6	0.2	17.4	5.5	0.3	14.4	1.4	2.0	0.9	32.5
witzer	0	1.0	0.2	3.4	49.0	19.0	3.9	19.9	3.3	0.2	14.4	0.1	2.0	3.7	31.7
2-ton cargo trailer	3.4	23.5	0.3	0.1	41.7	11.1	0.5	17.1	2.0	0.3	78.4	2.1	7.5	0.8	3.1
2-ton cargo trailer	3.4	5.3	0.2	0	50.2	17.4	0.6	17.5	5.0	0.3	78.4	1.4	0	0.6	7.7
Category 6: 5-Ton Payload															
None	0	0.7	0.1	0	50.9	19.2	4.2	22.7	1.9	0.3	14.4	0.1	0.8	0.9	33.2
	0	0.4	0.2	0	45.3	19.2	8.7	21.3	4.2	0.7	0	0	2.0	1.0	2.0
	3.4	0.1	0.2	0	51.9	7.8	8.9	24.7	2.7	0.2	78.4	0.1	0	0.1	15.5
	3.4	24.5	0.1	0	37.4	8.1	2.5	20.6	3.1	0.2	78.4	1.5	0	0.1	8.3
er	3.4	11.9	0.1	0.1	44.6	14.7	2.5	21.3	1.1	0.3	78.4	1.5	0	0	8.4
er	3.4	3.6	0.2	0	22.8	45.0	1.0	16.0	7.0	1.0	78.4	1.4	0	0	0.2
load (12,700 lb)**	3.4	23.5	0.2	0.1	42.0	9.2	2.1	17.1	2.1	0.1	78.4	2.6	0	0	13.6
load (12,700 lb)**	41.0	3.5	0	0	23.4	[illegible]	2.5	20.6	2.4	0.3	85.2	1.4	0	0.6	7.1
Category 7: 8-Ton Payload															
None	0	0.9	0	0	23.0	2.9	0.1	66.3	5.9	0.9	14.4	0.0	0.6	0.9	2.4
Category 8: 5-Ton Tractor with 12-Ton, 4-Wheel Trailer															
ton, stake semitrailer	41.0	3.5	0	0	22.8	7.6	2.5	19.9	2.5	0.2	85.2	1.4	0	0.6	6.5
ton semitrailer	3.4	70.5	0.1	0	12.4	3.1	0	10.2	0.1	0	78.4	12.2	0	0.9	6.7
ton semitrailer	3.4	23.5	0.2	0.1	46.0	9.0	0.1	17.1	0.4	0.1	78.4	2.6	0	0	13.6
ton, low-bed semitrailer	41.0	15.2	0	0	20.6	5.8	0.1	14.6	2.5	0.2	85.2	2.5	0	0	6.1
Category 9: 10-Ton Tractor with 25-Ton, 4-Wheel Trailer															
on, low-bed semitrailer	42.1	3.5	0.1	0	23.5	7.8	0.1	22.1	0.4	0.4	100.0	0	0	0	0
on, low-bed semitrailer	42.1	15.1	0.1	0	21.8	0.8	0.1	16.9	3.2	0.1	100.0	0	0	0	0
Category 10: 22-1/2-Ton Tractor with 52-1/2-Ton Trailer															
2-ton, heavy equipment ed semitrailer	41.0	15.2	0	0	18.4	7.5	0.5	16.9	0.3	0.1	85.2	2.5	0	1.0	5.7
2-ton, heavy equipment ed semitrailer	100.0	0	0	0	0	0	0	0	0	0	100.0	0	0	0	0
Category 11: Tracked Vehicles															
None	0	0.1	0.2	0	50.8	20.9	2.8	20.3	4.7	0.2	0	0	0.8	0.9	2.5
None	0	0.1	0.2	0	57.8	12.0	1.1	22.2	5.3	1.5	0	0	0.7	0.9	5.9
None	0	0.1	0	0	44.6	29.6	0.5	24.2	0.4	0.6	0	0	0	0	0.9
Category 12: Other Vehicles															
None	0	0.4	0.1	0	53.5	11.0	9.1	24.8	0.1	1.0	0	0	55.4	2.5	5.8
None	0	0.4	0.2	0	52.6	7.6	13.3	24.5	0.5	1.4	0	0	72.5	2.5	2.2
None	0	0.4	0.2	0	39.3	15.6	14.0	24.6	5.1	0.8	0	0	2.0	1.7	0
Category 13: Additional Vehicles															
None	0	0.4	0.3	0	53.8	0.9	13.4	24.9	5.8	0.5	0	0	72.5	2.5	5.9
None	0	0.4	0	0	25.0	39.9	9.1	16.4	8.3	0.9	0	0	0	0.9	0.5
2-ton heavy equipment ed semitrailer	42.1	15.1	0	0	14.8	9.9	0.5	16.9	0.6	0.2	100	0	0	0	0

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Percent Traverse Distance																				
	Thailand										Arizona									
10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
0.4	0	0	2.0	1.8	34.0	1.0	14.7	1.2	3.6	41.7	0	0.3	0	0	55.2	0.2	0.7	0.4	0	43.1
0.4	78.4	1.2	7.5	0.5	3.9	0.6	4.7	1.8	1.0	0.4	0	1.5	37.3	0	21.0	0	0.3	39.9	0	0
0.4	78.4	1.4	0	0.3	6.5	0.4	7.5	0.4	0.7	4.2	0	8.0	0	0	49.5	0	0.6	0.3	0	41.6
0.3	14.4	1.4	2.0	0.9	32.5	36.6	5.7	1.0	1.3	4.1	0	8.0	0	0	51.6	0	0.3	0.2	0	39.9
0.2	14.4	0.1	2.0	3.7	31.7	36.6	5.8	0.8	0.9	4.0	0	3.7	0	3.7	52.0	0	0.3	0.4	0	39.9
0.3	78.4	2.1	7.5	0.8	3.1	0	4.9	1.8	1.0	0.4	0	3.3	37.3	0	20.3	0	0.3	38.9	0	0
0.3	78.4	1.4	0	0.6	7.7	0	5.6	0.7	1.5	4.0	0	8.0	0	0	51.2	0	0.7	0.2	1.0	38.8
0.3	14.4	0.1	0.8	0.9	33.2	2.3	9.9	0.7	3.0	34.9	0	0.3	0	0	58.2	0.3	0.7	0.2	0	40.3
0.7	0	0	2.0	1.0	2.0	0.4	20.4	0.7	1.3	72.2	0	0.3	0	0	26.1	0.3	0.7	[illegible]	0	72.0
0.2	78.4	0.1	0	0.1	15.5	0.1	2.9	2.4	0.3	0.4	0	3.7	0	0	78.1	0	0.3	0.2	0	17.7
0.2	78.4	1.5	0	0.1	8.3	2.3	3.3	0.6	3.5	2.0	0	3.7	0	2.6	53.1	0	0.3	0.3	0	40.1
0.3	78.4	1.5	0	0	8.4	2.2	3.0	0.6	4.7	1.2	0	3.7	0	0	55.8	0	0.2	0.2	0	40.1
1.0	78.4	1.4	0	0	0.2	0.8	8.2	0.7	2.6	7.7	0	3.7	0	0	24.2	0.4	0.3	0.5	0	70.9
0.1	78.4	2.6	0	0	13.6	0	2.5	2.1	0.3	0.4	0	8.0	0	0	73.8	0	0.3	0.2	0	17.7
0.3	85.2	1.4	0	0.6	7.1	0.3	3.0	0.7	0.7	0.9	0	8.0	0	0	51.6	0	0.3	0.2	0	39.9
0.9	14.4	0.0	0.6	0.9	2.4	0.0	2.3	15.2	2.9	61.3	0	0.3	0	0	32.0	1.1	0.2	0.4	0	65.9
Trailer																				
0.2	85.2	1.4	0	0.6	6.5	1.2	2.7	0.7	0.7	0.9	0	8.0	0	0	51.2	0.3	0.2	0.2	0	39.9
0	78.4	12.2	0	0.9	6.7	0.1	0.4	1.1	0.1	0.1	0	8.0	0	0	74.0	0	0	0.2	0	17.7
0.1	78.4	2.6	0	0	13.6	0	2.6	2.2	0.4	0.1	0	8.0	0	0	74.1	0	0	0.2	0	17.7
0.2	85.2	2.5	0	0	6.1	1.7	1.8	0.7	1.0	0.9	0	8.0	0	0	51.5	0.3	0	0.2	0	39.9
Trailer																				
0.4	100.0	0	0	0	0	0	0	0	0	0	0	3.7	0	0	38.7	0.1	0	0.3	0	57.2
0.1	100.0	0	0	0	0	0	0	0	0	0	0	8.0	0	0	74.1	0	0	0.1	0	17.8
Trailer																				
0.1	85.2	2.5	0	1.0	5.7	2.6	0.5	0.6	0.6	1.1	0	8.0	0	0	49.1	0	0.2	0.2	0	42.4
0	100.0	0	0	0	0	0	0	0	0	0	0	8.0	0	0	73.8	0.1	0.2	0.1	0.2	17.6
0.2	0	0	0.8	0.9	2.5	0.6	21.1	0.9	1.7	71.6	0	0	0	0	33.8	1.6	0.2	0.4	0.3	63.6
1.5	0	0	0.7	0.9	5.9	0.5	15.6	0.8	2.4	73.3	0	0	0	0	19.9	1.1	0.2	5.5	0	73.5
0.6	0	0	0	0	0.9	1.0	13.9	10.3	1.6	72.3	0	0	0	0	35.5	3.0	0	0	0	61.6
.0	0	0	55.4	2.5	5.8	0	15.9	1.2	0.5	18.7	0	0.3	0	0	30.0	0.2	0.9	0	0	68.6
.4	0	0	72.5	2.5	2.2	0.1	19.3	1.2	0.4	1.8	0	0.3	0.5	0	26.3	0	1.0	0.2	0	72.0
.8	0	0	2.0	1.7	0	0	24.4	1.7	1.8	68.4	0	0.3	0	0	32.6	0.3	1.5	0.4	0.3	64.6
.5	0	0	72.5	2.5	5.9	0.1	16.1	1.3	0.1	1.5	0	0.3	0	0	29.9	0.2	0.9	0	0	68.7
.9	0	0	0	0.9	0.5	2.0	19.3	0.9	2.5	74.0	0	0.3	0	0	23.5	0.7	1.5	0.6	0	73.4
.2	100	0	0	0	0	0	0	0	0	0	0	3.7	0	0	41.8	0	0.2	0.3	0.1	53.9

B

C

Table 12

Comparison of VCI_1 and VCI_{50} on Off-Road Vehicle Performance

Vehicle (No.)	West Germany Areal Only V_{100}	West Germany Areal Only V_{90}	West Germany % Go V_{100}	Thailand Areal Only V_{100}	Thailand Areal Only V_{90}	Thailand % Go V_{100}	Arizona Areal Only V_{100}	Arizona Areal Only V_{90}	Arizona % Go V_{100}
1-Pass									
M35A2 (25)	4.3	6.6	99.4	1.7	5.2	96.2	3.2	4.2	99.7
M813 (32)	3.3	5.2	99.2	0.6	1.9	83.9	2.4	2.9	99.7
M656 (33)	6.6	11.9	99.4	1.7	3.4	97.0	4.1	5.4	99.7
M818 (41)	0.2	0.2	55.4	0.1	0.1	12.7	0.8	2.4	92.0
50-Pass									
M35A2 (25)	0.2	0.3	59.0	0.1	0.1	13.9	3.2	4.2	99.7
M813 (32)	0.2	0.3	59.1	0.1	0.1	13.3	2.4	2.9	99.7
M656 (33)	2.1	10.5	96.5	0.1	0.1	21.5	4.1	5.4	99.7
M818 (41)	0.2	0.2	42.9	0.1	0.1	0	0.8	2.4	92.0

Table 13

Comparison of Speed Performance on Smooth, Level, and Sloping Primary Roads

Vehicle	(No.)	Miles Per Hour: Up 3% Slope	Down 3% Slope	Level
M818/M127A1C	(41)	25.4	50.0	50.0
6x4 (comm)/M127A1C	(42)	26.9	59.0	59.0
6x4 (comm)/M127A1C	(43)	38.3	59.0	59.0
M818 (6x4)/M127A1C	(44)	25.4	50.0	50.0
M123A1C/M172A1	(45)	16.9	46.0	41.9
6x4 (comm)/M172A1	(46)	25.4	31.0	31.0
XM746 (8x8)/M747	(47)	19.1	38.5	38.5
8x4 (comm)/M747	(48)	15.9	67.0	39.9

Note: 70 mph speed limit imposed.

Table 14

Areal Traverse Characteristics as "Seen" by the Vehicles

	West Germany High*	West Germany Low**	Thailand High*	Thailand Low**	Arizona High*	Arizona Low**
V_{100}, mph	6	1	2	0.1	3	1
V_{90}, mph	11	4	4	0.1	7	2
Percent GO	99	86	97	14	99	82
Terrain Factors Controlling						
Soils and Slopes, %	18	27	1	80	1	5
Ride, %	49	44	2	6	31	44
Obstacle Override, %	1	1	74	5	67	48
Vegetation and Other, %	32	28	23	9	1	3

*High = Three high-mobility vehicles (M656, M656, M113)

**Low = Three standard vehicles with mobility reduced by front-wheel drive denial (M715E1M,M35A2M, M813M)

Table 15

Percentage of Areal Terrain GO for Selected Military Vehicles

Payload Category (tons)	High Mobility Vehicle	High Mobility Transects W.G.	T	A	Standard Mobility Vehicle	Standard Mobility Transects W.G.	T	A	Low Mobility Vehicle	Low Mobility Transects W.G.	T	A
1/4					M151A2	99.4	25.1	99.2				
1/2					M274A2	99.6	21.0	99.2				
3/4					M37B1	99.4	95.8	99.7				
1-1/4	M561	99.4	96.2	99.7	M715E1	99.1	82.4	99.2				
					XM705	99.3	96.5	59.6				
2-1/2					M35A2	99.4	96.2	99.7				
5	M656	99.4	97.0	99.7	M813	99.2	83.9	99.7	M818/ M127A1C	55.4	12.7	92.0
8	M520E1	99.3	84.0	99.7								
10									M123A1C/ M172A1	54.3	0.0	96.3
22-1/2									XM746/ M747	43.7	11.2	92.0
Ref (Tracked)	M113	99.7	98.4	100.0								

Table 16

V_{100} for Selected Military Vehicles

Payload Category (tons)	High Mobility Vehicle	High Mobility Transects W.G.	High Mobility Transects T	High Mobility Transects A	Standard Mobility Vehicle	Standard Mobility Transects W.G.	Standard Mobility Transects T	Standard Mobility Transects A	Low Mobility Vehicle	Low Mobility Transects W.G.	Low Mobility Transects T	Low Mobility Transects A
1/4					M151A2	4.8	0.1	3.0				
1/2					M274A2	4.1	0.1	3.3				
3/4					M37E1	5.0	1.5	3.5				
1-1/4	M561	5.7	1.4	2.8	M715E1	4.9	0.5	2.9				
					XM705	5.1	1.7	0.5				
2-1/2					M35A2	4.3	1.7	3.2				
5	M656	6.6	1.[illegible]	4.1	M813	3.3	0.6	2.4	M818/ M127A1C	0.2	0.1	0.8
8	M520E1	3.6	0.5	3.3								
10									M123A1C/ M172A1	0.2	0.1	0.9
22-1/2									XM746/ M747	0.2	0.1	0.9
Ref (Tracked)	M113	6.8	3.2	5.9								

Table 17

Average Speed on Type 2 Roads for Selected Military Vehicles

Payload Category (tons)	High Mobility				Standard Mobility				Low Mobility			
		Transects				Transects				Transects		
	Vehicle	W.G.	T	A	Vehicle	W.G.	T	A	Vehicle	W.G.	T	A
1/4					M151A2	32.2	37.0	34.5				
1/2					M274A2	10.6	7.8	7.7				
3/4					M37B1	28.4	32.9	31.0				
1-1/4	M561	29.0	30.7	29.1	M715E1	30.4	34.1	32.1				
					XM705	30.4	31.3	29.6				
2-1/2					M35A2	25.5	25.2	24.2				
5	M656	26.0	25.3	24.3	M813	21.0	17.5	17.2	M818/ M127A1C	20.5	16.9	16.7
8	M520E1	20.3	16.9	16.7								
10									M123A1C/ M172A1	7.9	5.8	5.7
22-1/2									XM746/ M747	11.6	8.7	8.5
Ref (Tracked)	M113	23.2	21.7	21.1								

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Effects of Speed Limits on Primary Road Performance

Vehicle	(No.)	West Germany Limit mph	West Germany Pred. Speed, mph	West Germany Limit, mph	West Germany Pred. Speed, mph	Thailand Limit, mph	Thailand Pred. Speed, mph	Thailand Limit, mph	Thailand Pred. Speed mph	Arizona Limit, mph	Arizona Pred. Speed, mph	Arizona Limit, mph	Arizona Pred. Speed mph
M818/127A1C	(41)	50	35.9	70	35.9	50	48.7	70	48.7	50	42.5	70	42.5
6x4 (comm)/M127A1C	(42)	50	35.9		38.8	50	48.7		56.9	50	42.5		47.9
6x4 (comm)/M127A1C	(43)	50	35.9		38.8	50	48.7		56.9	50	42.5		47.9
M818 (6x4)/M127A1C	(44)	50	35.9		35.9	50	48.7		48.7	50	42.5		42.5
M123A1C/M172A1	(45)	30	26.2		32.5	30	29.7		41.1	30	27.8		36.9
6x4 (comm)/M172A1	(46)	30	26.2		26.8	30	29.7		30.7	30	27.8		28.6
XM746 (8x8)/M747	(47)	36	29.7		30.9	36	35.5		37.9	36	32.5		34.4
8x4 (comm)/M747	(48)	36	29.7		31.6	36	35.5		39.2	36	29.0		35.5

Table 19

<u>Ranking of Off-Road Performance of Study Vehicles</u>
<u>Using V_{90} as the Criterion, West Germany Traverse</u>

(Using updated V_{90} from Addendum I)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
1	56	5-to 8-ton, 8x8 (c)	12.4	0.3
2	33	M656, 5-ton, 8x8	11.9	0.6
3	14	M561, 1-1/4-ton, 6x6	10.3	0.6
4	37	M656, 5-ton, 8x8/H†	10.0	7.2
5	20	M561, 1-1/4-ton, 6x6/T	8.9	0.6
6	13	XM705, 1-1/4-ton, 4x4	8.8	0.7
7	2	1/4-ton, 4x4 (100 in. WB) (c)*	8.4	1.0
8	21	M561, 1-1/4-ton, 6x6/H	8.3	1.2
9	10	M37B1, 3/4-ton, 4x4	8.1	0.6
10	6	1/4-ton, 4x4, (c)/T**	8††	1.0
11	1	M151A2, 1/4-ton, 4x4	7.9	0.6
12	34	5-ton, 6x4 (c)	7.9	3.7
13	15	1-1/4-ton, 4x4 (100 in. WB) (c)	7.5	1.0
14	55	1/4-ton, 4x4 (c) (85 in. WB)	7.4	0.6
15	12	M715E1, 1-1/4-ton, 4x4	7.4	0.9
16	5	M151A2, 1/4-ton, 4x4/T	7.4	4.0
17	11	M37B1, 3/4-ton, 4x4/T	7.3	0.9
18	3	M151A2, 1/4-ton, 4x2	7.3	4.3
19	18	M715E1, 1-1/4-ton, 4x4/T	6.9	0.9
20	16	M715E1, 1-1/4-ton, 4x2	6.7	7.2
21	25	M35A2, 2-1/2-ton, 6x6	6.6	0.6
22	19	XM705, 1-1/4-ton, 4x4/T	6.4	1.0
23	22	1-1/4-ton, 4x4 (c)/T	6.4	6.5
24	17	1-1/4-ton, 4x2 (c)	6.1	7.4
25	4	1/4-ton, 4x2 (c)	6	9.1
26	27	M35A2, 2-1/2-ton, 6x4	5.9	7.2
27	24	1-1/4-ton, 4x2 (c)/T	5.5	9.1
28	9	M274A2, 1/2-ton, 4x4	5.3	0.4
29	32	M813, 5-ton, 6x6	5.2	0.8
30	29	M35A2, 2-1/2-ton, 6x6/H	4.7	4.6
31	23	M715E1, 1-1/4-ton, 4x2/T	3.9	9.1
32	28	M35A2, 2-1/2-ton, 6x6/T	3.5	4.6
33	31	M35A2, 2-1/2-ton, 6x4/T	3.2	9.0

(Continued)

(1 of 2 Sheets)

*Commercial (c).
**Trailer (T).
†Howitzer (H).
††Values without decimals are estimated per Addendum I.

Table 19 (Concluded)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
34	40	M520E1, 8-ton, 4x4	2.5	0.7
35	26	2-1/2-ton, 4x4 (c) (150 in. WB)	1.3	14.2
36	36	M813, 5-ton 6x6/H	1.2	15.5
37	7	M151A2, 1/4-ton, 4x2/T	1.0	18.0
38	8	1/4-ton, 4x2 (c)/T	0.8	20.9
39	43	5-ton, 6x4 (c)(150 in. WB)/T	0.5	27.2
40	35	M813, 5-ton, 6x4	0.5	28.0
41	38	5-ton, 6x4 (c)/T	0.4	27.2
42	30	2-1/2-ton, 4x2 (c)(150 in. WB)/T	0.4	28.0
43	39	M813, 5-ton 6x4/T	0.2	44.6
44	41	M818, 5-ton 6x6/T	0.2	44.6
45	45	M123A1C, 10-ton, 6x6/T	0.2	45.7
46	44	M818, 5-ton, 6x4/T	0.2	56.2
47	57	22-1/2-ton, 8x6 (c)/T	0.2	57.2
48	46	10-ton, 6x4 (182 in. WB)/T	0.2	57.3
49	47	XM746, 22-1/2-ton, 8x8/T	0.2	58.3
50	42	5-ton, 6x4 (c), (152 in. WB)/T	0.1	74.1
51	48	22-1/2-ton, 8x4 (c)/T	0.1	100.0

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Table 20

Ranking of Off-Road Performance of Study Vehicles
Using V_{90} as the Criterion, Thailand Traverse
(Using updated V_{90} from Addendum I)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
1	13	XM705, 1-1/4-ton, 4x4	5.9	3.5
2	25	M35A2, 2-1/2-ton, 6x6	5.3	3.8
3	56	5- to 8-ton, 8x8 (c)*	4.1	0.9
4	10	M37B1, 3/4-ton, 4x4	3.9	4.2
5	33	M656, 5-ton, 8x8	3.4	3.0
6	14	M561, 1-1/4-ton, 6x6	3.1	3.8
7	20	M561, 1-1/4-ton, 6x6/T**	3.1	4.4
8	32	M813, 5-ton, 6x6	1.9	16.1
9	12	M715E1, 1-1/4-ton, 4x4	1.5	17.6
10	40	M520E1, 8-ton, 4x4	1.5	16.0
11	19	XM705, 1-1/4-ton, 4x4/T	1.2	18.4
12	11	M37B1, 3/4-ton, 4x4/T	1.1	18.4
13	28	M35A2, 2-1/2-ton, 6x6/T	1.0	18.7
14	18	M715E1, 1-1/40ton, 4x4/T	0.9	19.1
15	21	M561, 1-1/4-ton, 6x6/H†	0.7	19.8
16	29	M35A2, 2-1/2-ton, 6x6/H	0.7	20.2
17	55	1/4-ton, 4x4 (c)(85 in. WB)	0.1	74.9
18	1	M151A2, 1/4-ton, 4x4	0.1	74.9
19	2	1/4-ton, 4x4 (c)	0.1	75.7
20	3	M151A2, 1/4-ton, 4x2	0.1	78.9
21	4	1/4-ton, 4x2 (c)	0.1	90.3
22	5	M151A2, 1/4-ton, 4x4/T	0.1	76.1
23	6	1/4-ton, 4x4 (c)/T	0.1	78.6
24	7	M151A2, 1/4-ton, 4x2/T	0.1	81.3
25	8	1/4-ton, 4x2 (c)/T	0.1	90.2
26	9	M274A2, 1/2-ton, 4x4	0.1	79.0
27	15	1-1/4-ton, 4x4 (c)	0.1	79.8
28	16	M715E1, 1-1/4-ton, 4x2	0.1	42.7
29	17	1-1/4-ton, 4x2 (c)	0.1	88.0
30	22	1-1/4-ton, 4x4 (c)/T	0.1	80.5
31	23	M715E1, 1-1/4-ton, 4x2/T	0.1	81.5
32	24	1-1/4-ton, 4x2 (c)/T	0.1	89.0
33	26	2-1/2-ton, 4x2 (c)	0.1	87.6

(Continued)

*Commercial (c).
**Trailer (T).
†Howitzer (H).

(1 of 2 Sheets)

Table 20 (Concluded)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
34	27	M35A2, 2-1/2-ton, 6x4	0.1	80.1
35	30	2-1/2-ton, 4x2 (c)/T	0.1	38.8
36	31	M35A2, 2-1/2-ton, 6x4	0.1	80.5
37	34	5-ton, 6x4 (c)	0.1	78.5
38	35	M813, 5-ton, 6x4	0.1	80.0
39	36	M813, 5-ton, 6x6/H	0.1	79.1
40	37	M656, 5-ton, 8x8/H	0.1	79.8
41	38	5-ton, 6x4, (c)/T	0.1	81.0
42	39	M813, 5-ton 6x4/T	0.1	87.3
43	41	M818, 5-ton, 6x6/T	0.1	87.3
44	42	5-ton, 6x4 (c)(152 in. WB)/T	0.1	[illegible]1.5
45	43	5-ton, 6x4 (c)(150 in. WB)/T	0.1	81.0
46	44	M818, 5-ton, 6x4/T	0.1	87.8
47	45	M123A1C, 10-ton, 6x6/T	0.1	100.0
48	46	10-ton, 6x4 (c)/T	0.1	100.0
49	47	XM746, 22-1/2-ton, 8x8/T	0.1	88.8
50	48	22-1/2-ton, 8x4 (c)/T	0.1	100.0
51	57	22-1/2-ton, 8x6 (c)/T	0.1	100.0

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Table 21

Ranking of Off-Road Performance of Study Vehicles Using V_{90} as the Criterion, Arizona Traverse

(Using updated V_{90} from Addendum I)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
1	37	M656, 5-ton, 8x8/H†	6.6	3.7
2	55	1/4-ton, 4x4 (c) (85 in. WB)	6.4	0.3
3	34	5-ton, 6x4 (c)	5.8	3.7
4	33	M656, 5-ton, 8x8	5.4	0.3
5	12	M715E1, 1-1/4-ton, 4x4	5.1	0.8
6	18	M715E1, 1-1/4-ton, 4x4/T**	5.0	4.2
7	23	M715E1, 1-1/4-ton, 4x2/T	5.0	4.2
8	16	M715E1, 1-1/4-ton, 4x2	5††	4.2
9	13	XM705, 1-1/4-ton, 4x4	4.8	0.3
10	10	M37B1, 3/4-ton, 4x4	4.7	0.3
11	1	M151A2, 1/4-ton, 4x4	4.7	0.8
12	9	M274A2, 1/2-ton, 4x4	4.7	0.8
13	3	M151A2, 1/4-ton, 4x2	4.4	4.2
14	56	5- to 8-ton, 8x8 (c)	4.3	0.3
15	29	M35A2, 2-1/2-ton, 6x6/H	4.3	7.9
16	48	22-1/2-ton, 8x4 (c)*/T	4.3	8.0
17	25	M35A2, 2-1/2-ton, 6x6	4.2	0.3
18	11	M37B1, 3/4-ton, 4x4/T	4.2	3.7
19	38	5-ton, 6x4 (c)/T	4	8.0
20	40	M520E1, 8-ton, 4x4	3.9	0.3
21	27	M35A2, 2-1/2-ton, 6x4	3.8	8.0
22	57	22-1/2-ton, 8x6 (c)/T	3.7	3.7
23	14	M561, 1-1/4-ton, 6x6	3.6	0.3
24	20	M561, 1-1/4-ton, 6x6/T	3.5	0.3
25	21	M561, 1-1/4-ton, 6x6/H	3.5	0.3
26	5	M151A2, 1/4-ton, 4x4/T	3.4	4.2
27	7	M151A2, 1/4-ton, 4x2/T	3.3	8.5
28	19	XM705, 1-1/4-ton, 4x4/T	3.2	3.7
29	36	M813, 5-ton, 6x6/H	3.1	3.7
30	39	M813, 5-ton, 6x4/T	3.0	8.0
31	47	XM746, 22-1/2-ton, 8x8/T	3.0	8.0
32	43	5-ton, 6x4 (150 in. WB)(c)/T	3.0	8.0
33	32	M813, 5-ton, 6x6	2.9	0.3

(Continued)

*Commercial (c).

**Trailer (T).

†Howitzer (H).

††Values without decimals are estimates per Addendum I.

Table 21 (Concluded)

Rank	Vehicle No.	Vehicle Identification	V_{90} Speed mph	V_{100} % No Go
34	28	M35A2, 2-1/2-ton, 6x6/T	2.9	8.0
35	31	M35A2, 2-1/2-ton, 6x4/T	2.9	8.0
36	35	M813, 5-ton, 6x4	2.8	6.3
37	41	M818, 5-ton, 6x6/T	2.4	8.0
38	44	M818, 5-ton, 6x4/T	2.4	8.0
39	46	10-ton, 6x4 (182 in. WB)(c)/T	2.4	8.0
40	42	5-ton, 6x4 (152 in. WB)(c)/T	2.1	8.0
41	45	M123A1C, 10-ton, 6x6/T	1.4	8.0
42	2	1/4-ton, 4x4 (c)	0.3	37.5
43	6	1/4-ton, 4x4 (c)/T	0.3	38.8
44	4	1/4-ton, 4x2 (c)	0.3	38.9
45	15	1-1/4-ton, 4x4 (c)	0.3	39.6
46	8	1/4-ton, 4x2 (c)/T	0.3	40.6
47	22	1-1/4-ton, 4x4 (c)/T	0.2	40.9
48	17	1-1/4-ton, 4x2 (c)	0.2	41.0
49	24	1-1/4-ton, 4x2 (c)/T	0.2	42.2
50	26	2-1/2-ton, 4x2 (150 in. WB)(c)	0.2	49.4
51	30	2-1/2-ton, 4x2 (150 in. WB)(c)/T	0.2	50.3

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Table 22

Ranking of On-Road Performance of Study Vehicles Using Speed on Type 2 Roads (V_2) as the Criterion, West Germany Traverse

(Using updated V_2 from Addendum I)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
1	3	M151A2, 1/4-ton, 4x2	34.1	(39.0)
2	1	M151A2, 1/4-ton, 4x4	32.1	(39.0)
3	13	XM705, 1-1/4-ton, 4x4	30.4	(39.0)
4	5	M151A2, 1/4-ton, 4x4/T**	30.4	(35.9)
5	19	XM705, 1-1/4-ton, 4x4/T	29.4	(37.6)
6	2	1/4-ton, 4x4 (c)*	29.2	(39.0)
7	4	1/4-ton, 4x2 (c)	29††	(39.0)
8	14	M561, 1-1/4-ton, 6x6	29.0	(37.6)
9	10	M37B1, 3/4-ton, 4x4	28.4	(37.6)
10	34	5-ton, 6x4 (c)	27.6	(34.3)
11	20	M561, 1-1/4-ton, 6x6/T	27.2	(37.6)
12	21	M561, 1-1/4-ton, 6x6/H†	27.2	(37.6)
13	6	1/4-ton, 4x4 (c)/T	27	(35.9)
14	43	5-ton, 6x4 (c)(150 in. WB)/T	26.6	(35.9)
15	33	M656, 5-ton, 8x8	26.0	(35.9)
16	25	M35A2, 2-1/2-ton, 6x6	25.5	(35.9)
17	27	M35A2, 2-1/2-ton, 6x4	25.5	(35.9)
18	12	M715E1, 1-1/4-ton, 4x4	25.3	(39.0)
19	16	M715E1, 1-1/4-ton, 4x2	25	(35.9)
20	56	5- to 8-ton, 8x8 (c)	25.0	(35.5)
21	38	5-ton, 6x4 (c)/T	25	(31.6)
22	11	M37B1, 3/4-ton, 4x4/T	24.6	(37.6)
23	55	1/4-ton, 4x4 (c) (85 in. WB)	24.4	(39.0)
24	26	2-1/2-ton, 4x2 (c)(150 in. WB)	23.3	(36.2)
25	18	M715E1, 1-1/4-ton, 4x4/T	23	(37.6)
26	23	M715E1, 1-1/4-ton, 4x2/T	23	(37.6)
27	15	1-1/4-ton, 4x4 (c)	22.4	(39.0)
28	17	1-1/4-ton, 4x2 (c)	22	(39.0)
29	29	M35A2, 2-1/2-ton, 6x6/H	21.9	(35.9)
30	37	M656, 5-ton, 8x8/H	21.6	(35.9)
31	28	M35A2, 2-1/2-ton, 6x6/T	21.4	(35.9)

(Continued)

*Commercial (c).
**Trailer (T).
†Howitzer (H).
††Values without decimals are estimates per Addendum I.

(1 of 2 Sheets)

Table 22 (Concluded)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
32	30	2-1/2-ton, 4x2 (c)(150 in. WB)/T	21.2	(35.9)
33	22	1-1/4-ton, 4x4 (c)/T	21	(37.6)
34	24	1-1/4-ton, 4x2 (c)/T	21	(37.6)
35	32	M813, 5-ton, 6x6	21.0	(35.9)
36	35	M813, 5-ton, 6x4	21.0	(35.9)
37	31	M35A2, 2-1/2-ton, 6x4/T	20.5	(35.9)
38	41	M818, 5-ton, 6x6/T	20.5	(35.9)
39	44	M818, 5-ton, 6x4/T	20.3	(35.9)
40	40	M520E1, 8-ton, 4x4	20.3	(26.2)
41	36	M813, 5-ton, 6x6/H	19.3	(35.9)
42	39	M813, 5-ton, 6x4/T	19.2	(35.9)
43	8	1/4-ton, 4x2 (c)/T	16.5	(35.9)
44	7	M151A2, 1/4-ton, 4x2/T	15.9	(35.9)
45	47	XM746, 22-1/2-ton, 8x8/T	11.6	(29.7)
46	48	22-1/2-ton, 8x4 (c)/T	11.5	(29.7)
47	9	M274A2, 1/2-ton, 4x4	10.6	(22.8)
48	57	22-1/2-ton, 8x6 (c)/T	8.5	(26.9)
49	45	M123A1C, 10-ton, 6x6/T	7.9	(26.2)
50	46	10-ton, 6x4 (c)(182 in. WB)/T	7	(26.2)
51	42	5-ton, 6x4 (c) (152 in. WB)/T	3	(35.9)

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Table 23

Ranking of On-Road Performance of Study Vehicles Using Speed On Type 2 Roads (V_2) as the Criterion, Thailand Traverse

(Using updated V_2 from Addendum I)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
1	1	M151A2, 1/4-ton,4x4	37.0	(57.8)
2	3	M151A2, 1/4-ton, 4x2	37.0	(57.8)
3	5	M151A2, 1/4-ton, 4x4/T	34.6	(48.7)
4	7	M151A2, 1/4-ton, 4x2/T	34.6	(48.7)
5	2	1/4-ton, 4x4 (c)*	33††	(57.8)
6	4	1/4-ton, 4x2 (c)	33	(57.8)
7	10	M37B1, 3/4-ton, 4x4	32.9	(53.3)
8	6	1/4-ton, 4x4 (c)/T**	32	(48.7)
9	13	XM705, 1-1/4-ton, 4x4	31.3	(57.8)
10	56	5- to 8-ton, 8x8 (c)	31.3	(53.2)
11	14	M561, 1-1/4-ton, 4x4	30.7	(53.3)
12	19	XM705, 1-1/4-ton, 4x4/T	30.7	(53.3)
13	20	M561, 1-1/4-ton, 6x6/T	29.1	(53.3)
14	21	M561, 1-1/4-ton, 6x6/H†	29.1	(53.3)
15	11	M37B1, 3/4-ton, 4x4/T	28.8	(53.3)
16	33	M656, 5-ton, 8x8	25.3	(48.7)
17	25	M35A2, 2-1/2-ton, 6x6	25.2	(48.7)
18	27	M35A2, 2-1/2-ton, 6x4	25.2	(48.7)
19	15	1-1/4-ton, 4x4 (c)	24	(57.8)
20	17	1-1/4-ton, 4x2 (c)	24	(57.8)
21	40	M520E1, 8-ton, 4x4	23.8	(29.7)
22	37	M656, 5-ton, 8x8/H	23.8	(29.7)
23	12	M715E1, 1-1/4-ton, 4x4	23.1	(57.8)
24	16	M715E1, 1-1/4-ton, 4x2	23	(57.8)
25	22	1-1/4-ton, 4x4 (c)/T	23	(53.3)
26	24	1-1/4-ton, 4x2 (c)/T	23	(53.3)
27	43	5-ton, 6x4 (c) (150 in. WB)/T	23	(48.7)
28	34	5-ton, 6x4 (c)	23	(45.0)
29	18	M715E1, 1-1/4-ton, 4x4/T	21	(53.3)
30	23	M715E1, 1-1/4-ton, 4x2/T	21	(53.3)
31	38	5-ton, 6x4 (c)/T	21	(38.4)
32	26	2-1/2-ton, 4x2 (c)	20.7	(49.7)
33	55	1/4-ton, 4x4 (c) (85 in. WB)	20.1	(57.8)
34	28	M35A2, 2-1/2-ton, 6x6/T	20.0	(48.7)
35	29	M35A2, 2-1/2-ton, 6x6/H	19.8	(48.7)

(Continued)

* Commercial (c)

** Trailer (T)

† Howitzer (H)

†† Values without decimals are estimates per Addendum I.

Table 23 (Concluded)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
36	30	2-1/2-ton, 4x2 (c)/T	19.4	(48.7)
37	31	M35A2, 2-1/2-ton, 6x4/T	19.4	(48.7)
38	42	5-ton, 6x4 (c) (152 in. WB)/T	19	(48.7)
39	32	M813, 5-ton, 6x6	17.5	(48.7)
40	35	M813, 5-ton, 6x4	17.5	(48.7)
41	8	1/4-ton, 4x2 (c)/T	17	(48.7)
42	41	M818, 5-ton, 6x6/T	16.9	(48.7)
43	44	M818, 5-ton, 6x4/T	16.9	(48.7)
44	36	M813, 5-ton, 6x6/H	16.8	(48.7)
45	39	M813, 5-ton, 6x4/T	16.8	(48.7)
46	57	22-1/2-ton, 8x6 (c)/T	10.1	(34.9)
47	48	22-1/2-ton, 8x4, (c)/T	8.9	(35.5)
48	47	M746, 22-1/2-ton, 8x8/T	8.7	(35.5)
49	9	M274A2, 1/2-ton, 4x4	7.8	(24.8)
50	45	M123A1C, 10-ton, 6x6/T	5.8	(29.7)
51	46	10-ton, 6x4/T	5	(29.7)

(2 of 2 sheets)

Table 24

Ranking of On-Road Performance of Study Vehicles Using Speed On Type 2 Roads (V_2) as the Criterion, Arizona Traverse

(Using updated V_2 from Addendum I)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
1	1	M151A2, 1/4-ton, 4x4	34.5	(48.5)
2	3	M151A2, 1/4-ton, 4x2	34.5	(48.5)
3	5	M151A2, 1/4-ton, 4x4/T**	32.5	(42.5)
4	7	M151A2, 1/4-ton, 4x2/T	32.5	(42.5)
5	2	1/4-ton, 4x4 (c)*	31††	(48.5)
6	4	1/4-ton, 4x2 (c)	31	(48.5)
7	10	M37B1, 3/4-ton, 4x4	31.0	(45.6)
8	56	5-8-ton, 8x8 (c)	29.7	(45.4)
9	13	XM705, 1-1/4-ton, 4x4	29.6	(48.5)
10	14	M561, 1-1/4-ton, 6x6	29.1	(45.6)
11	19	XM705, 1-1/4-ton, 4x4/T	29.1	(45.6)
12	6	1/4-ton, 4x2 (c)/T	29	(42.5)
13	20	M561, 1-1/4-ton, 6x6/T	27.8	(45.6)
14	21	M561, 1-1/4-ton, 6x6/H†	27.8	(45.6)
15	11	M37B1, 3/4-ton, 4x4/T	27.5	(45.6)
16	33	M656, 5-ton, 8x8	24.3	(42.5)
17	25	M35A2, 2-1/2-ton, 6x6	24.2	(42.5)
18	27	M35A2, 2-1/2-ton, 6x4	24.2	(42.5)
19	15	1-1/4-ton, 4x4 (c)	24	(48.5)
20	17	1-1/4-ton, 4x2 (c)	24	(48.5)
21	40	M520E1, 8-ton, 4x4	23.1	(27.8)
22	22	1-1/4-ton, 4x4 (c)/T	23	(45.6)
23	24	1-1/4-ton, 4x2 (c)/T	23	(45.6)
24	43	5-ton, 6x4, (150 in. WB)/T	23	(42.5)
25	34	5-ton, 6x4	23	(39.8)
26	12	M715E1, 1-1/4-ton, 4x4	22.4	(48.5)
27	16	M715E1, 1-1/4-ton, 4x2	22	(48.5)
28	37	M656, 5-ton, 8x8/H	21.4	(42.5)
29	18	M715E1, 1-1/4-ton, 4x4/T	21	(45.6)
30	23	M715E1, 1-1/4-ton, 4x2/T	21	(45.6)
31	38	5-ton, 6x4 (c)/T	21	(34.8)
32	26	2-1/2-ton, 4x2 (c) (150 in. WB)	20.2	(43.1)

(Continued)

(1 of 2 sheets)

* Commercial (c)
** Trailer (T)
† Howitzer (H)
†† Values without decimals are estimates per Addendum I.

Table 24 (Concluded)

Rank	Vehicle No.	Vehicle Identification	Type 2 (V_2) Speed mph	Type 1 (V_1) Speed mph
33	55	1/4-ton, 4x4 (c) (85 in. WB)	19.6	(48.5)
34	28	M35A2, 2-1/2-ton, 6x6/T	19.6	(42.5)
35	30	2-1/2-ton, 4x2(c)(150 in. WB)/T	19.3	(42.5)
36	29	M35A2, 2-1/2-ton, 6x6/H	19.2	(42.5)
37	31	M35A2, 2-1/2-ton, 6x4/T	19.1	(42.5)
38	42	5-ton, 6x4, (152 in. WB)/T	19	(42.5)
39	32	M813, 5-ton, 6x6	17.2	(42.5)
40	35	M813, 5-ton, 6x4	17.2	(42.5)
41	41	M818,5-ton, 6x6/T	16.7	(42.5)
42	44	M818, 5-ton, 6x4/T	16.7	(42.5)
43	48	22-1/2-ton, 8x4 (c)/T	16.7	(29.0)
44	36	M813, 5-ton, 6x6/H	16.6	(42.5)
45	39	M813, 5-ton, 6x4/T	16.6	(42.5)
46	8	1/4-ton, 4x2 (c)/T	16	(42.5)
47	57	22-1/2-ton, 8x6 (c)/T	9.9	(32.0)
48	47	XM746, 22-1/2-ton, 8x8/T	8.5	(32.5)
49	9	M274A2, 1/2-ton, 4x4	7.7	(23.7)
50	45	M123A1C, 10-ton 6x6/T	5.7	(27.8)
51	46	10-ton, 6x4, (c) (182 in. WB)/T	5	(27.8)

(2 of 2 sheets)

ADDENDUM I

APPLICATION OF EXPERIMENTAL RIDE DYNAMICS RELATIONS FOR SELECTED VEHICLES

1. Mobility evaluations given in the main report were based on predictions made with the AMC Ground Mobility Model (AMC-71), of off-road performance of the several vehicles. Because of the large number of vehicles involved and the short time available for their evaluation, it was necessary to use as input to AMC-71 ride-speed limits for each vehicle as a function of surface roughness; these imputs were computed by a simplified ride dynamics simulation. In recognition of possible inaccuracies incurred by use of the simplified dynamics, adjustments were made to calculated ride-speed limit curves for a number of standard military vehicles for which relatively reliable experience factors were available. Where such experience guidance was unavailable, computed values were used directly.

2. Study of overall speed predictions by AMC-71 for off-road and on secondary roads and trails shows that ride-speed limits, in general, control operational speeds of some one half of travel distances in secondary road and trail operations and in off-road operations in the West Germany and Arizona transects. Predicted overall speeds are accordingly sensitive to the relative accuracy of assigned ride-speed limits. Whereas, as discussed in the main report (paragraph 5.2.2), the influence of ride-speed errors in overall projected speeds off-road is attenuated by (essentially) the total complexity of the off-road situation, the influence of the errors on secondary road-speed predictions is relatively direct (paragraph 5.2.6). In addition, on secondary roads ride speeds over relatively minor roughness (as compared to many off-road surfaces) become controlling, and the simplified ride dynamics modeling appears least reliable in the low range of roughnesses (up to about 1.5 RMS).

3. In recognition of the importance of ride-speed inputs to the overall mobility evaluation, a two-week field program was conducted during

July 1972 in which five commercial vehicles, ranging from a 1/4-ton truck to a 5-ton tractor with 12-ton trailer, were ride-tested over four courses varying in roughness from 0.5 to 2.2 in RMS.* Ten available military vehicles covered in the initial study were run at the same time to check the adequacy of the empirical corrections used in the study for this group of vehicles (see Table I-1). Tests were run using a v-ride meter recently developed by TACOM to measure directly the vertical power absorbtion at the driver's seat during operation.

4. From the results of tests of each vehicle over each course at several speeds, experimental 6-watt ride-level curves were established for all 15 of the vehicles involved. Ride-speed limits for each vehicle, read from smooth curves through the experimental points, are given in Table I-1, along with similar values representative of those used in initial evaluations. Those vehicles whose calculated ride-speed limits as used in the main study were adjusted by an experience factor are indicated, and places where original values differ from measured values by more than 2 mph and more than 50 percent are underlined.

5. Except for the values for the XM410, which was included in the study solely as a reference vehicle, ride-speed limits used in evaluating those military vehicles for which experience adjustments were possible are considered close enough to measured values that overall on- and off-road speed predictions as presented in the main report may be generally accepted. Ride-speed limits assigned for these vehicles appear to have been slightly higher than measured values, however, except in the case of the M813. Limits assigned to the M818 tractor with M127A1C trailer are also in good agreement, even though no experience adjustment was made.

6. On the other hand, ride-speed limits assigned to the commercial vehicles, as was suspected at the time the main report was prepared, differ significantly from measured values. The lighter commercial vehicles were assigned values that appear too high; the heavier vehicles, values that appear far too low.

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* N. R. Murphy, Jr., and A. S. Lessem, "Bench-Mark Field Tests of Vehicle Site Dynamics (Unpublished).

7. In view of the results in relation to the commercial vehicles, the commercial vehicles for which measurements were available were rerun in AMC-71 on roads in the West Germany transect, and in all three off-road transects. For even-handed comparison with the commercial 1-1/4-ton, the M715E1 was also rerun using the measured ride-speed values. V_{100} and V_{90} results are summarized in Table I-2, and on-road speeds in the West Germany transect in Table I-3, in each case along with the corresponding values from the original evaluations. Results for all six vehicles in cross-country operations in Thailand were unchanged because of the high percentage of soft-soil and/or obstacle No Go's experienced, and they are not shown. (No Go's were, of course, unaffected by the change in ride-speed limits.)

8. Based upon these results, it appears that V_{90} and V_2 speeds for the commercial vehicles, the M715E1 in various configurations, and the XM410 should be reassigned as given in Table I-4. (Original values in Table 10 should be used to compare the M715E1 and the XM705.)

Table I-1

Comparison of Measured Vehicle Ride with Values Used in Original Evaluation

WHEELS Item No.	Vehicle	Vehicle Ride at 6 watts, MPH: Values Used in Main Report RMS, in.: Values Adjusted by Experience	1	2	3	Experimental Values 1	2	3
53	M151A1, 1/4-ton, 4x4 utility truck	No	19.5	7.6	6.0	19	7	(4)
1	M151A2, 1/4-ton, 4x4 utility truck	Yes	32.0	8.0	5.0	20	6	(3)
52	M38A1, 1/4-ton, 4x4 utility truck	No	12.0	6.0	5.0	16	6	(4)
2	Commercial, 1/4-ton, 4x4 utility truck	No	53.0	18.0	6.0	30	6	(3)
10	M37B1, 3/4-ton, 4x4 cargo truck	Yes	30.0	8.0	4.4	24	6	(3)
12	M715E1, 1-1/4-ton, 4x4 cargo truck	Yes	30.0	7.6	4.0	16	6	(3)
15	Commercial, 1-1/4-ton, 4x4 cargo truck	No	38.0	7.0	4.0	11	5	(3)
25	M35A2, 2-1/2-ton, 6x6 cargo truck	Yes	21.5	7.5	3.0	18	6	(3)
26	Commercial, 2-1/2-ton, 4x2 (151 in. WB)	No	15.5	2.2	2.0	17	5	(3)
54	XM410, 2-1/2-ton, 8x8 cargo truck	Yes	50.0	20.0	14.0	26	(9)	(5)
32	M813, 5-ton, 6x6 cargo truck*	Yes	12.5	5.0	2.5	17	5	(3)
34	Commercial, 5-ton, 6x4 cargo truck	No	3.0	3.0	2.8	20	6	(3)
41	M818, 5-ton, 6x6 tractor truck/ M127A1C, 4-wheel, 12-tonstake semitrailer	No	12.5	3.6	1.8	11	4	(2)
43	Commercial, 5-ton (150 in. WB) tractor truck	No	4.0	3.0	2.0	19	7	(4)
49	M113A1 armored, full-tracked, personnel carrier	No	16.8	9.4	8.1	23	9	(5)

*M54 actually tested; ( ) - extrapolated for comparison.

Table I-2

Revised Off-Road Speeds

WHEELS Item No.	Vehicle	Original Predictions, mph				Revised Predictions, mph			
		West Germany		Arizona		West Germany		Arizona	
		V_{100}	V_{90}	V_{100}	V_{90}	V_{100}	V_{90}	V_{100}	V_{90}
2	Commercial, 1/4-ton, 4x4 utility truck	4.6	11.4	0.2	0.3	3.9 (-15%)	8.2 (-28%)	0.2 -	0.3 -
12	M715E1, 1-1/4-ton, 4x4 cargo truck	4.9	7.6	2.9	4.4	3.2 (-35%)	7.4 (-3%)	3.2 (+10%)	5.1 (+16%)
15	Commercial, 1-1/4-ton, 4x4 cargo truck	3.8	7.5	0.2	0.3	3.8	7.0 (-7%)	0.2	0.3
26	Commercial, 2-1/2-ton, 4x2 (151 in. WB) cargo truck	0.6	1.3	0.2	0.2	0.6	1.6 (+23%)	0.2	0.2
34	Commercial, 5-ton, 6x4 cargo truck	1.4	3.1	1.5	3.3	1.9 (+36%)	7.9 (+129%)	1.8 (+20%)	5.8 (+75%)
43	Commercial, 5-ton, 6x4 (150 in. WB) tractor truck	0.3	0.4	0.9	2.6	0.3 -	0.5 (+25%)	0.9 -	3.0 (+15%)

Table I-3

Revised On-Road Speeds (MPH)
West Germany Traverse

WHEELS

Item No.	Vehicle	Original Prediction V_3	Original Prediction V_2	Original Prediction V_1	Revised Prediction V_3	Revised Prediction V_2	Revised Prediction V_1
2	Commercial, 1/4-ton, 4x4 utility truck	11.6	34.4	39.0	9.1 (-21%)	24.2 (-15%)	39.0 -
12	Commercial, 1/4-ton, 4x4 utility truck	8.0	30.4	39.0	8.1 (+1%)	25.3 (-17%)	37.4 (-4%)
15	Commercial, 1-1/4-ton, 4x4 cargo truck	7.8	33.1	39.0	6.7 (-14%)	22.4 (-32%)	39.0 -
26	Commercial, 2-1/2-ton, 4x4 (151 in. WB) cargo truck	3.4	23.3	36.2	8.0 (+136%)	25.0 (+7%)	35.9 (-1%)
34	Commercial, 5-ton, 6x4 cargo truck	3.6	7.3	34.3	10.6 (+195%)	27.6 (+278%)	34.3 -
43	Commercial, 5-ton, 6x4 (150 in. WB) tractor truck	3.2	9.1	35.9	5.6 (+75%)	26.6 (+192%)	35.9 -

Table I-4

Revised V_{90} and V_2 Speeds (mph) for Selected Vehicles in the Wheels Study

Wheels Item No.	Vehicle	Original Predictions						Revised Predictions					
		West Germany		Thailand		Arizona		West Germany		Thailand		Arizona	
		V_{90}	V_2	V_{90}	V_2	V_{90}	V_2	V_{90}	V_2	V_{90}	V_2	V_{90}	V_2
2	1/4-ton, 4x4 utility truck	11.4	34.4	0.1	49.2	0.3	44.8	8.4	29.2	*	33	*	31
4	1/4-ton, 4x2 utility truck	8.2	34.4	0.1	49.2	0.3	44.8	6	29	*	33	*	31
6	1/4-ton, 4x4 utility truck**	10.9	32.6	0.1	45.1	0.3	41.4	8	27	*	32	*	29
8	1/4-ton, 4x2 utility truck**	0.8	16.5	0.1	45.1	0.3	41.4	*	*	*	17	*	16
12	M715E1, 1-1/4-ton, 4x4 cargo truck	7.6	30.4	1.4	34.1	4.4	32.1	*	25.3	*	23.1	5.1	22.4
16	M715E1, 1-1/4-ton, 4x2 cargo truck	6.7	30.4	0.1	34.1	4.2	32.1	*	25	*	23	5	22
18	M715E1, 1-1/4-ton, 4x4 cargo truck**	6.9	28.2	0.9	31.6	4.4	30.0	*	23	*	21	5	21
23	M715E1, 1-1/4-ton, 4x2 cargo truck**	3.9	28.2	0.1	31.6	4.3	30.0	*	23	*	21	5	21
15	1-1/4-ton, 4x4 cargo truck	7.5	33.1	0.1	40.9	0.3	37.8	*	22.4	*	24	*	24
17	1-1/4-ton, 4x2 cargo truck	6.1	33.1	0.1	40.9	0.2	37.8	*	22	*	24	*	24
22	1-1/4-ton, 4x4 cargo truck**	6.4	31.8	0.1	39.7	0.2	36.8	*	21	*	23	*	23
24	1-1/4-ton, 4x2 cargo truck**	5.5	31.8	0.1	39.7	0.2	36.8	*	21	*	23	*	23
26	2-1/2-ton, 4x2 (151 in. WB) cargo truck	1.3	23.3	0.1	20.7	0.2	20.2	*	*	*	*	*	*
30	2-1/2-ton, 4x4 (151 in. WB) cargo truck	0.4	21.2	0.1	19.4	0.2	19.3	*	*	*	*	*	*

(Continued)

*Unchanged. Figures given without decimals are estimates.
**With appropriate trailer.

(1 of 2 Sheets)

Table I-4 (Concluded)

WHEELS Item No.	Vehicle	Original Predictions West Germany V_{90}	V_2	Thailand V_{90}	V_2	Arizona V_{90}	V_2	Revised Predictions West Germany V_{90}	V_2	Thailand V_{90}	V_2	Arizona V_{90}	V_2
34	5-ton, 6x4 cargo truck	3.1	7.3	0.1	4.8	3.3	4.7	7.9	27.6	*	23	5.8	23
38	5-ton, 6x4 cargo truck	0.4	5.3	0.1	4.2	2.5	4.1	*	25	*	21	4	21
42	5-ton, 6x4 (152 in. WB) tractor truck	0.1	5.2	0.1	5.8	2.1	5.7	*	3	*	19	*	19
43	5-ton, 6x4 (150 in. WB) tractor truck	0.4	9.1	0.1	6.3	2.6	6.1	0.5	26.6	*	23	3.0	23
46	10-ton, 6x4 (182 in. WB) tractor truck	0.2	5.8	0.1	3.8	2.4	3.8	*	7	*	5	*	5
48	22-1/2-ton, 8x4 tractor truck	0.1	11.5	0.1	8.9	4.3	8.7	*	*	*	*	*	*
54	XM410, 2-1/2-ton, 8x8 cargo truck	16.0	31.6	7.4	45.0	14.1	41.2	12	28	6	32	10	31

(2 of 2 Sheets)

ADDENDUM II

EVALUATION OF ADDITIONAL VEHICLES

1. At the request of the WHEELS Study Group, three additional commercial vehicles were evaluated during August using AMC-71, as follows:

Item No.	Vehicle
55	1/4-ton, 4x4 utility truck (85 in. WB)
56	Experimental 5-8 ton 8x8 cargo truck
57	22-1/2-ton 8x6 tractor truck, with M747 heavy equipment transporter

2. Principal characteristics of these three vehicles in the format of Table 9 of the main report are given in Table II-1. Detailed vehicle input information, in the format of that given in Appendix C, is given in Tables II-2 through II-8.

3. Because of the unusual features of vehicle 56, and of the known criticality of dynamics behavior to AMC-71 speed predictions in the three study transects, 6-watt ride-speed and 2.5-g obstacle-crossing speed limits for this vehicle were determined experimentally in tests conducted at Camp Roberts, Calif., during August. These values were used in the AMC-71 predictions.

4. Ride dynamics for vehicle 55, whose suspension and mass configuration closely resembles that of the M38A1 1/4-ton, were assumed to be similar to those for the M38A1. Dynamic speed limits for item 55 were accordingly made similar to values measured for the M38A1. Dynamic speed limits for item 57 were assumed to be similar to those for the other two vehicles in its weight class evaluated in the main study (items 47 and 48).

5. Speed and No Go predictions for the three added vehicles were made using AMC-71. Off-road and on-road predictions were again made for the West Germany, Thailand, and Arizona transects.

6. AMC-71 predictions have been incorporated (as Category 13, Additional Vehicles) in Tables 10 and 11 of the main report and in the revised rankings given in Tables 19-24.

Table II-1

Summary of Vehicle Characteristics and Some Performance Parameters

			Vehicle Characteristics						
Item No.	Vehicle	Trailer/Howitzer	Gross Vehicle Weight lb	Wheel Base in.	Horse-power Per Ton HPT	Ground Clear-ance in.	Ap-proach Angle deg	Depar-ture Angle deg	Wheel Spacing in.
55	1/4-ton, 4x4 utility truck	None	3,250	85	43.7	9	47	42	85
56	Experimental 5-8 ton, cargo truck	None	32,650	160	13.6	15	55	65	102
57	22-1/2-ton, 8x6 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment trans-porter, low-bed semitrailer	177,304	137	5.9	10.8	45	82	77

			Vehicle Performance								
			VCI_1		Max Speed	Speeds for Obstacle Heights, 2.5g			Speeds for RMS Values, 6 watt		
Item No.	Vehicle	Trailer/Howitzer	Fine Grained	Coarse Grained	MPH	2 in.	6 in.	10 in.	1	2	3
55	1/4-ton, 4x4 utility truck	None	19	24	60	60	14.6	5.2	14.5	6	5
56	Experimental 5-8 ton, cargo truck	None	21	11	58	58	30	8	44.5	22	10
57	22-1/2-ton, 8x6 tractor truck	M747, 8-wheel, 52-1/2-ton, heavy equipment trans-porter, low-bed semitrailer	105	53	58	58	18.6	6.7	8	4	3

Table II-2

Values of Vehicle Characteristics Used in AMC-71 Ground Mobility Model

Vehicle Characteristics		Dimensions	Vehicle No.		
No.	Identification		55	56	57
1	Vehicle type (NVEH = 0 for tracked and 1 for wheeled)	—	1	1	1
2	Gross vehicle weight	kips	3.25	32.6	177
3	Track type (NFL = 0 for nonflexible and 1 for flexible)	in.	NA	NA	NA
4	Grouser height for tracks; number of tires for wheeled tire ply rating	—	4	8	24
5	Tire ply rating	—	6	12	18
6	Gross rated horsepower	bhp	71	225	525
7	Number of people in vehicle on normal mission	—	2	3	3
8	Winch capacity (use 0 for no winch)	kips	0	0	0
9	Number of tracks or tires	—	4	8	24
10	Number of axles	—	2	4	8
11	Vehicle width	in.	64	96	120
12	Vehicle length	in.	136	299	668
13	Track width or nominal tire width	in.	7	16	18
14	Wheel rim diameter	in.	16	20	22.5
15	Recommended tire pressure (highway)	psi	23	45	90
16	Recommended tire pressure (cross-country)	psi	20	12	45
17	Area of one track shoe (tracked) or number of wheels (wheeled)	$in.^2$	4	8	24
18	Number of bogies (tracked) or chain indicator wheeled (0 = no chains, 1 = chains)	—	0	0	0
19	Maximum vertical step the vehicle can climb	in.	—	—	—
20	Vehicle ground clearance at the center of greatest wheel span	in.	13	34	27
21	Minimum vehicle ground clearance	in.	9	15	11
22	Rear end clearance (vertical clearance of vehicle trailing edge)	in.	10	32	40
23	Vehicle departure angle	deg	42	65	82
24	Vertical clearance of vehicle's leading edge	in.	18	22.5	32
25	Vehicle approach angle	deg	47	55	45
26	Length of track on ground or wheel diameter	in.	30	52	46
27	Height of vehicle pushbar	in.	18	41	32
28	Distance between first and last wheel center lines	in.	85	268	197
29	Horizontal distance from the center of gravity to the front wheel center lines	in.	45	108	75
30	Vertical distance from the center of gravity to the road wheel center lines	in.	10	32	20
31	Maximum span between adjacent wheel center lines	in.	85	102	77
32	Angle between a line parallel to the ground surface and the line connecting the center of gravity and the center of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle	deg	NA	NA	NA

(Continued)

(1 of 3 sheets)

Table II-2 (Continued)

Vehicle Characteristics					
No.	**Identification**	**Dimensions**	**55**	**56**	**57**
33	Distance from the center of gravity to the center of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle	in.	NA	NA	NA
34	Vertical distance from the ground to the center of the rear wheel (road wheel or idler)	in.	14	22.5	21.4
35	Track thickness plus the radius of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle (wheeled = RW).	in.	14	22.5	21.4
36	Rolling radius of tire or sprocket pitch radius	in.	14	22.5	21.4
37	Weight of rigid point used to determine approach angle	in	18	34	32
38	Maximum braking force the vehicle develops	—	0.8	0.8	0.8
39	Loaded wheel radius	in.	14	22.5	21.4
40	Total ground contact area	in.^{2}	NA	NA	NA
41	Distance vehicle spans before significant motion begins	in.	15	26	23
42	Maximum force the pushbar can withstand	kips	3.25	32.6	[illegible]
43	Maximum axle load/gross vehicle weight	—	0.5	0.25	0.25
44	Vehicle rated horsepower per ton	hp/ton	44	13.6	5.9
45	Transmission type (0 = automatic; 1 = manual)	—	1	0	0
46	Final drive gear ratio	—	4.27	6.40	5.73
47	Final drive gear efficiency	—	0.9	0.9	0.9
48	Number of gears in transmission	—	6	10	6
49	Gear ratios for transmission	—	See table II-3		
50	Transmission efficiency	—	0.9	0.9	0.9
51	Gear ratio from engine to torque converter	—	NA	NA	NA
52	Denotes presence of a torque converter lockup (No = 0, Yes = 1)	—	NA	NA	NA
53	Input torque at which the torque converter curves were measured	—	NA	NA	NA
54	Number of point pairs in array TNE1 (see item 55)	—	NA	NA	NA
55	Array containing torque converter input speed versus converter torque ratio curve	—	NA	NA	NA
56	Number of point pairs in array TTM (see item 57)	—	NA	NA	NA
57	Array containing torque converter torque multiplying coefficient versus converter speed ratio curve	—	NA	NA	NA
58	Number of point pairs in array TTE (see item 59)	—	10	17	14
59	Array containing net engine torque versus engine speed curve	—	See table II-4		
60	Number of point pairs in array VOOB (see item 61)	—	30	26	30
61	Array containing vehicle velocity versus obstacle height at 2.5-g vertical acceleration	—	See table II-5		
62	Number of points in array VRIDE (see item 63)	—	7	7	8
63	Array containing ride dynamics versus speed curve	—	See table II-6		
64	Vehicle swimming speed	mph	0	0	0
65	Vehicle fording speed	mph	2	2	2

(Continued)

(2 of 3 sheets)

Table II-2 (Concluded)

Vehicle Characteristics					
No.	Identification	Dimensions	55	56	57
66	Auxiliary water propulsion factor (0.5 = No, 0.8 = Yes)	—	0.5	0.5	0.5
67	Ingress swamp angle of the vehicle	deg	60	60	60
68	Fording depth or draft height	in.	21	45	25
69	Recommended tire pressure (sand)	psi	15	7	15

(3 of 3 sheets)

Table II-3

Transmission Gear Ratios Used for Self-Propelled Vehicles

Vehicle Characteristic Number 49 In Table II-2

Vehicle No.	Gear Ratios for Transmission									
55	8.22	3.8	3.34	2.46	1.55	1.0				
56	11.18	8.04	4.98	3.58	2.91	2.09	1.93	1.39	1.39	1.0
57	4.00	2.68	2.07	1.35	1.04	0.69				

Table II-4

Tractive Force-Speed or Engine Speed-Engine Torque
Relations for Vehicle Characteristic No. 59 in Table II-2

Vehicle Number					
55		56		57	
Engine Speed rpm	Engine Torque ft-lb	Vehicle Speed mph	Tractive Force lb	Vehicle Speed mph	Tractive Force lb
800	115	0	25,000	0	55,000
1200	115	1.5	21,000	2.0	54,964
1600	115	2.5	17,300	3.1	46,099
2000	115	4.0	12,000	3.8	37,233
2400	112	5.0	10,400	5.3	28,369
2800	108	7.5	7,000	8.2	19,503
3200	103	10.0	5,000	10.0	16,312
3600	96	12.5	4,000	17.3	10,638
4000	88	15.0	3,300	20.0	9,574
4400	80	20.0	2,250	30.0	6,915
		25.0	2,000	40.0	5,851
		30.0	1,750	50.0	4,610
		35.0	1,600	58.0	1,773
		40.0	1,500	58.0	0
		45.0	1,250		
		50.0	1,200		
		55.0	1,000		
		55.0	0		

Table II-5

Obstacle Height-Speed Relations for Vehicle Characteristic No. 61 in Table II-2

Vehicle Number					
55		56		57	
Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed
1	131.2	1	88.4	2	74.6
2	131.2	7	88.4	3	74.6
3	58.3	8	67.7	4	42.0
4	32.8	9	53.5	5	26.9
5	21.0	10	43.3	6	18.6
6	14.6	11	35.8	7	13.7
7	10.7	12	30.1	8	10.5
8	8.2	13	25.6	9	8.3
9	6.5	14	22.1	10	6.7
10	5.2	15	19.3	11	5.5
11	4.3	16	16.9	12	4.7
12	3.6	17	15.0	13	4.0
13	3.1	18	13.4	14	3.4
14	2.7	19	12.0	15	3.0
15	2.3	20	10.8	16	2.6
16	2.0	21	9.8	17	2.3
17	1.8	22	9.0	18	2.1
18	1.6	23	8.2	19	1.9
19	1.5	24	7.5	20	1.7
20	1.3	25	6.9	21	1.5
21	1.2	26	6.4	22	1.4
22	1.1	27	5.9	23	1.3
23	1.0	28	5.5	24	1.2
24	0.9	29	5.2	25	1.1
25	0.8	30	4.8	26	1.0
26	0.8	40	4.8	27	0.9
27	0.7			28	0.9
28	0.7			29	0.8
29	0.6			30	0.7
30	0.6			40	0.7

Table II-6

Ride-Speed Relations for Vehicle Characteristic No. 63 in Table II-2

Vehicle No. 55		Vehicle No. 56		Vehicle No. 57	
RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph
0	60	0	58	0	58
0.2	60	0.2	58	0.2	58
0.75	23	0.5	32	0.5	28
1.0	14	1.0	28	1.0	8
1.7	7	2.0	11	2.0	4
3.0	5	3.0	4	3.0	3
9.0	3	8.5	2	4.0	3
				9.0	2

Table II-7

Speed Limits Used in Study, mph

Vehicle No.	Vehicle Name	Speed Limit mph	Recommended Towed Speed from TACOM Data Sheets		Dynamic Speed Limits Used in Vehicle Data File	
			Off Road	On Road	Off Road	On Road
	Category 1: 1/4-ton Payload					
55	4x4 Commercial (85 in. Wheelbase)	65	--	--	60	60
	Category 6 or 7: 5- to 8-ton Payload					
56	8x8 Experimental Commercial	58	--	--	58	58
	Category 10: 22-1/2-ton Tractor with 52-1/2-ton Trailer					
57	8x6 Commercial/M747	40	--	36	40	40

Table II-8

Vehicle Characteristics Used in Dynamics Submodels

No.	Identification	Dimensions	Vehicle Number 55	56	57
			Ride Dynamics Submodel		
1	Number of axles	—	2	4	4
2	Sprung mass	slugs	86.6	758	2440
3	Sprung mass divided by two	slugs	43.3	379	1220
4	Moment of inertia	slug-ft^2	720	38,400	33,602
5	Moment of inertia divided by two	slug-ft^2	360	19,200	16,801
6	Location of front axle relative to C.G.	ft	3.9	9.0	9.8
7	Location of second axle relative to C.G.	ft	-3.17	4.16	4.75
8	Location of third axle relative to C.G.	ft	—	-4.31	-1.6
9	Location of fourth axle relative to C.G.	ft	—	-9.2	-6.6
10	Location of driver relative to C.G.	ft	0.6	10	11.6
11	Spring constant for front axle	lb/ft	2850	9000	12,475
12	Spring constant for second axle	lb/ft	2850	9000	12,475
13	Spring constant for third axle	lb/ft	--	9000	16,124
14	Spring constant for fourth axle	lb/ft	--	9000	16,124
15	Damping constant for front axle	lb-sec/ft	142.5	75	720
16	Damping constant for second axle	lb-sec/ft	170.5	75	720
17	Damping constant for third axle	lb-sec/ft	--	75	720
18	Damping constant for fourth	lb-sec/ft	--	75	720
			Obstacle Dynamics Submodel		
19	Total load on front axle	lb	1365	8620	15,550
20	Bump stop height plus 1/3 of tire section height	in.	7.58	14	9
21	Total effective spring rate, front axle	lb/in.	475	1500	2060
22	Wheelbase	in.	85	218	137

VEHICLE MOBILITY ASSESSMENT

FOR

PROJECT WHEELS STUDY GROUP

APPENDIX A: ENVIRONMENTAL DESCRIPTION OF MOBILITY TRANSECTS

APPENDIX B: TERRAIN AND ROAD DATA

APPENDIX C: VEHICLE DATA*

APPENDIX D: SAMPLE OUTPUT LISTINGS

APPENDIX E: OFF-ROAD MOBILITY PROFILES FOR AREAL TERRAIN**

APPENDIX F: FACTORS CONTROLLING SPEED**

* Original inputs. See Addendum I for revised dynamic characteristics, Addendum II for characteristics of additional vehicles.

** Revisions and additions not included.

APPENDIX A: ENVIRONMENTAL DESCRIPTION OF MOBILITY TRANSECTS

1. WEST GERMANY

1.1 Location

The transect, located in the southeastern section of West Germany (fig. A1a), is bound by the following map coordinates: latitude 49° 02' to 49° 04' North, and longitude 8° 39' to 9° 22' east. The transect is 3 km wide and 52 km long. Several air photos of the area within the transect, located as shown in fig. A2a, are given in figs. A3a, A3b, and A3c.

1.2 Physiography

The transect is located in the Bavarian Plateau, which is a roughly triangular region covering most of southern Germany. The average elevation at the east end of the transect is about 375 m, and at the west end about 185 m, giving a relief of about 190 m. The transect is crossed from south to north by the Neckar River, a tributary of the Rhine River. East of the river, the area is mostly hilly with the hills capped with sandstone underlain by shale. Some sections of the hilly area are rugged, but for the most part, the terrain is rolling. West of the river, the area is tableland, which consists mostly of undulating to gently undulating terrain underlain primarily by limestone.

1.3 Drainageways

The Neckar River is the main river in the area. Several smaller rivers and streams originate in or cross the transect at various angles.

Flat, narrow terraces are frequently found along the river and stream banks. Some stream channels have been modified, and the banks may have man-made structures to protest against erosion.

1.4 Soils

The soils are mainly residual with clays and silts developing from the shales and limestones. Isolated patches of alluvial sands and gravels are found along former stream courses. Deposits of loess are commonly found adjacent to the Neckar River.

1.5 Land use

About 70 percent of the area in the transect is used for agriculture with grain the principal crop. Pasture lands are common. The higher, hilly lands and some of the bottomlands are used for forest, but in some hilly areas, vineyards are fairly common on the hillsides and are associated with man-made terraces.

1.6 Weather and climate

Long-term monthly rainfall and mean temperature data for Stuttgart, which is in the vicinity of the study area, are shown in fig. A4a. It can be seen that the rainfall is fairly evenly distributed throughout the year, ranging from 2 to 4 in. per month, with the heavier amounts occurring during the summer season. The rainfall amounts and distribution would indicate that excessive soil wetting would not occur except in the low-lying areas, thus fairly high soil strength would exist most of the time in areas with reasonable surface drainage. The mean monthly temperature pattern is typical of temperate climates, with an increase in mean temperature from January to July or August and then a decrease to December.

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The long-term maximum snow depth by month in the area of the transect is as follows:

Month	Depth, in.
Oct	0.8
Nov	1.6
Dec	4.7
Jan	5.1
Feb	8.7
Mar	5.5
Apr	1.6

The snow cover rarely remains on the ground more than two or three days, except during December, January, and February, when it may remain for periods of one to three weeks. During this time the average snow depth is generally less than 4 in.

1.7 Road network

A fairly well-developed network of primary, secondary, and trail-type roads exist in the area. Many trail-type roads occur throughout the countryside.

1.8 Towns and villages

Several towns and villages are located inside the transect, the principal ones being Kirchheim am Neckar, Gemmrigheim, Bonnigheim, and Brackenheim.

2. THAILAND

2.1 Location

The transect, located in the south central part of Thailand (fig. A1b), is bound by the following map coordinates: latitude 14° 15' to 14° 44' north and longitude 100° 52' to 100° 54' east. The transect

is 3 km wide and 53 km long. Several air photos of the area within the transect, located as shown in fig. A2b, are given in figs. A5a, A5b, and A5c.

2.2 Physiography

The transect lies within the Bangkok Plain, which consists of alluvial sediments. The Bangkok Plain lies within the Central Valley, which is one of the principal physiographic regions in Thailand. Near the coast, the Bangkok Plain is about 120 km wide, and at the northern end, which is about 200 km from the coast, it is about 60 km wide. Little relief is found in the area. In the northern end (about 8 km) of the transect, the floodplain lies slightly above 40 m, and the southern half less than [illegible] m. In the southern half of the transect three small islands of volcanic hills occur where the elevation ranges from 30 to 60 km above the plain. In the northern end, the hills rise to 200 to 300 m above the plain. The hills have steep slopes and contain limestone. Except for the hill areas, the transect is generally level.

2.3 Drainageways

The Pa Sak River, a tributary of the Chaophrayo River, crosses the transect from east to west at about 20 km south of the north end. Large and small canals and streams cross the transect at various locations. All streams and canals are used for irrigation.

2.4 Soils

Beginning at the south end of the transect and extending about 10 km northward, fat alluvial clays are found. Continuing northward from this point and extending northward for 38 km, the soils are alluvial lean

clays with some occurrences of fat clay. Continuing northward, the soils for the next 2 km are calcareous clays. From this point to the northern end of the transect, the land is hilly, and the soils are residual formed from limestone and igneous rock.

2.5 Land use

Most of the land in the transect is used for growing rice, which is flooded during the growing season. The lands used for rice cultivation are crossed by many dikes, ranging from 10 to 20 in. in height. Some small areas are elevated for growing vegetables and sugar cane. The hills are covered with trees and brush. Trees are also found along the banks of the Pa Sak River and of some of the larger streams.

2.6 Weather and climate

The long-term rainfall and mean temperature data recorded for Lopburi are shown in fig. A4b. The rainfall increases steadily from about 1 in. in January to about 11 in. in September and then decreases through December. During the growing season (May-September) the rice fields are flooded, causing the soils to remain soft during this period. From November to March, rice is not cultivated, and the rainfall is such that the rice fields become firm. The range in variation in mean monthly temperature is fairly small, with the lowest temperatures occurring in November, December, and January.

2.7 Road network

The road network is not too well developed in the area of the transect. Some primary and secondary roads are found, but the heaviest density occurs in trail-type roads. During the wet season, problems are encountered in traveling on trail-type roads.

2.8 Towns and villages

The principal towns and villages in the area are Ban Kaho Yai, Ban Phu Khai, Ban Mai, Ban Hin Kong, Nang Phra Vang, and Amphoe Nong Khai.

3. ARIZONA

3.1 Location

The Arizona transect is located in southwestern Arizona (fig. A1c). It is V-shaped, and its boundaries are described in fig. A2c. The transect is 3 km wide, and the southern boundary of the lower leg is 36 km long and the outer side of the leg lying in a northeasterly direction is 18 km long. Several air pohtos of the area within the transect, located as shown in fig. A2c, are given in figs. A6a, A6b, and A6c.

3.2 Physiography

The transect is located in the section of the Basin and Range physiographic province known as the Sonoran Desert. Most of it is located on a broad alluvial apron that has developed along the southern and western sides of Castle Dome Mountains. The western end of the transect (apex) lies on the western flank of a large, relatively flat hill (Fat Hill), which rises about 120 ft above the regional slope of the apron and causes a change in the pattern and direction of the regional drainage system. About 6 km from the north end of the transect, a cluster of hills rise abruptly above the general surface of the apron. The surface of the apron on which the transect is located is generally level, but some sections of the north and east ends of the transect are hilly.

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3.3 Drainageways

The alluvial apron is drained by many branching and braided ephemeral washes. The larger washes have broad steep-sided channels from less than 3 ft to occasionally over 25 ft deep. Locally, the drainage pattern is almost parallel; the washes cross the transect generally in a north-south direction, with the drainage flow in a southerly direction. Castle Dome wash is the main drainage feature in the transect crossing the western end in a north-to-south direction. This wash runs into the Gila River.

3.4 Soils

The soils are mixtures of alluvial sand, gravel, and silt. Their composition and texture are largely a function of their source or origin and their distance from the source. Bouldery and gravelly materials are found close to the mountain sources in the alluvial fans and in drainageways. The finer alluvia are deposited in the lower parts of the aprons. A desert pavement consisting of pebbles occurs on undisturbed apron surfaces. Underneath the pebble surface cover, silt and sand mixtures are found. In the western section of the transect, the surface is undulating and contains sandy material and a sparse growth of desert vegetation. Micro dunes are found in this area.

3.5 Land use

The transect is lcoated on the Yuma Proving Ground used for military testing activities. Palo verde, ironwood, creosote bush, and hycium comprise the dominant vegetation.

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3.6 Weather and climate

The long-term monthly rainfall and mean temperature data for Yuma are shown in fig. A4c. August is the only month in which more than 0.5 in. of rainfall occurs. The rainfall for the other months ranges from about 0.1 to 0.4 in. April, May, June, and July are the driest months. The mean temperature pattern is bell shaped, with the highest temperature occurring during the June-to-September period and the lower temperatures occurring during the fall and winter months. Differences in seasonal rainfall are so small that soil strengths remain essentially unchanged.

3.7 Road network

The density of various types of road networks is very small in the area. This is dictated largely by the type of land use. Most of the region is used as weapons impact areas, which are crossed by trail-type roads only.

3.8 Towns and villages

No towns or villages occur in the transect, nor are there any towns or villages near the area. Yuma, Arizona, is the principal city in the area.

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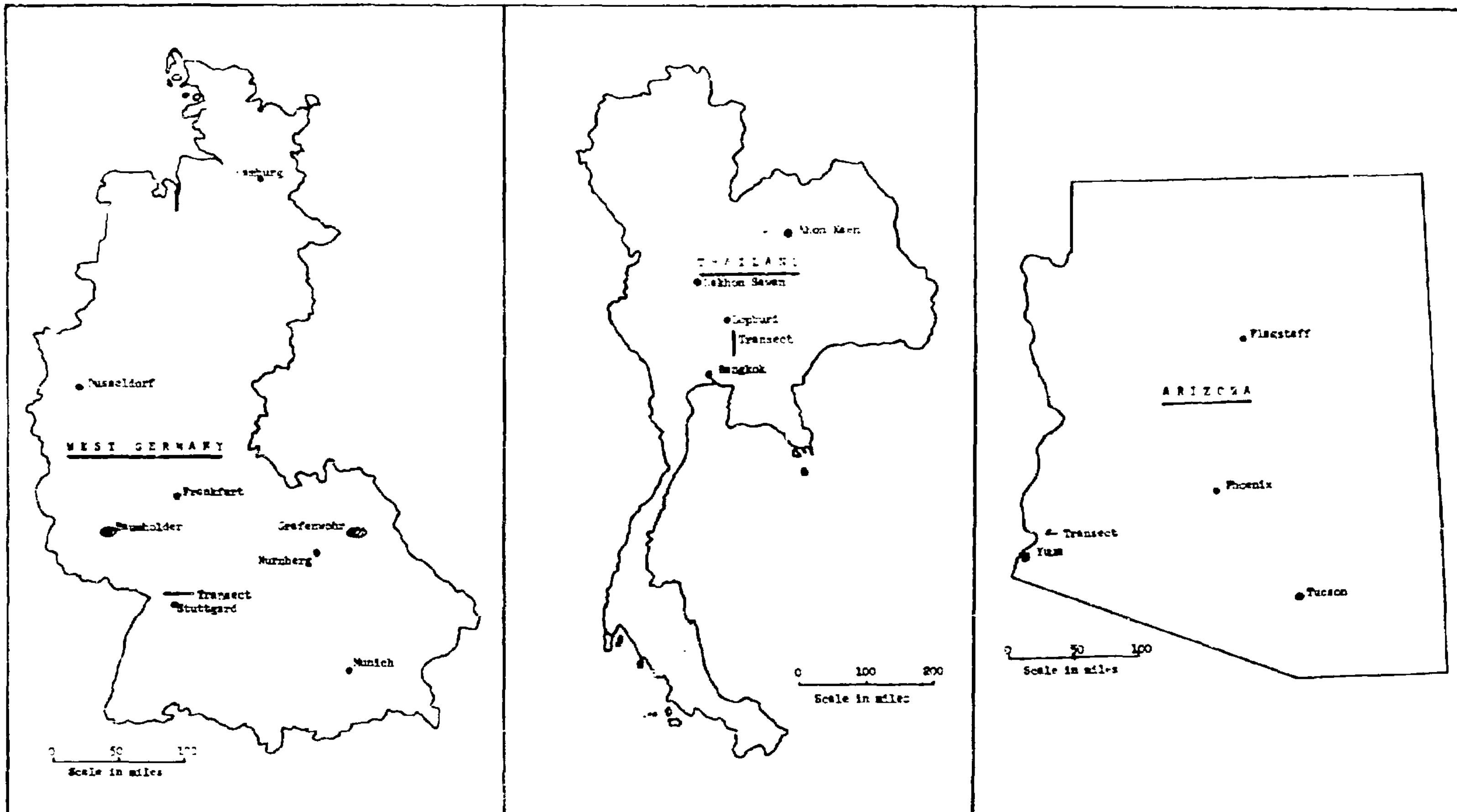


a.　　b.　　c.

Fig. A1. Geographic location of mobility transects

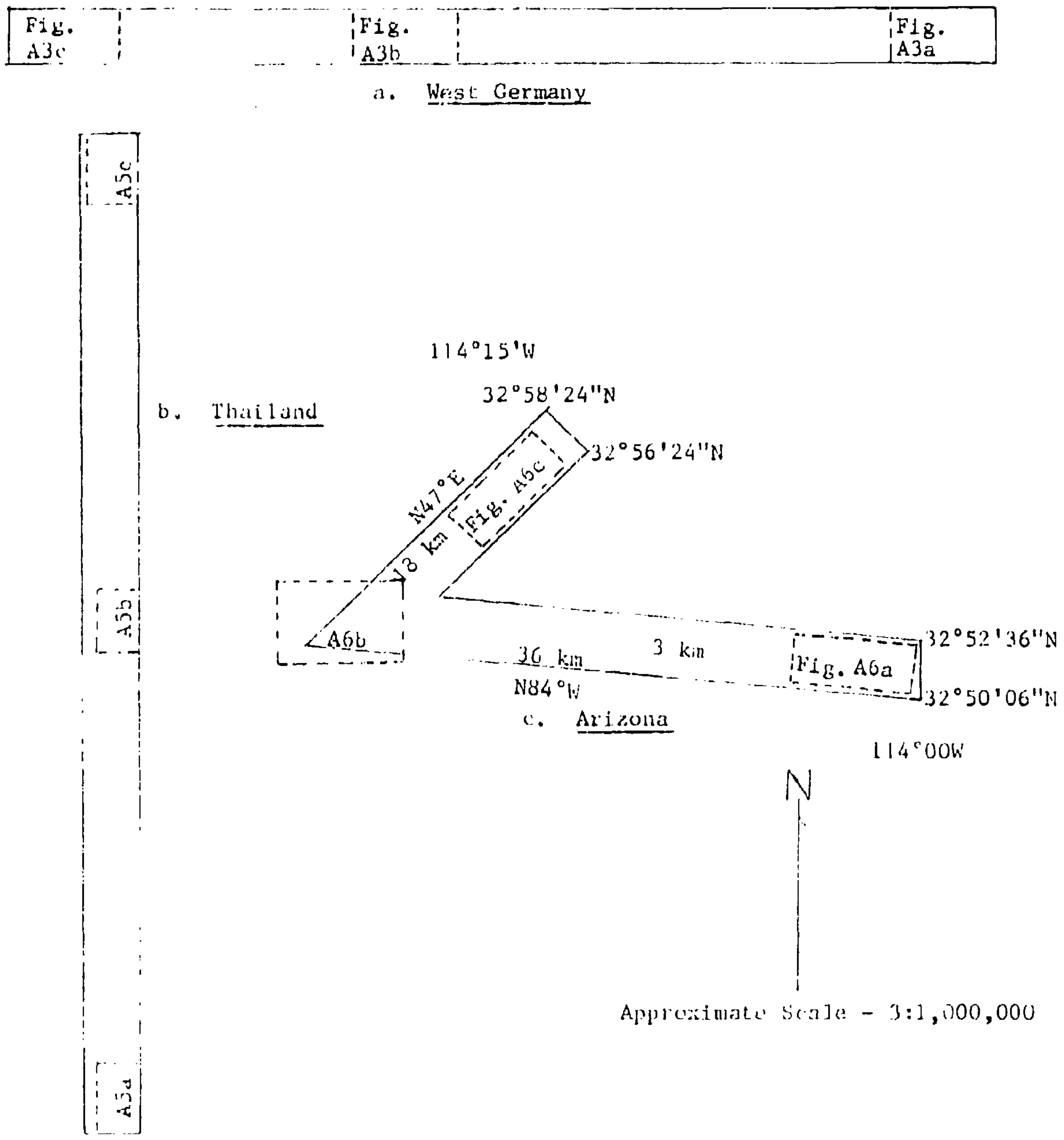
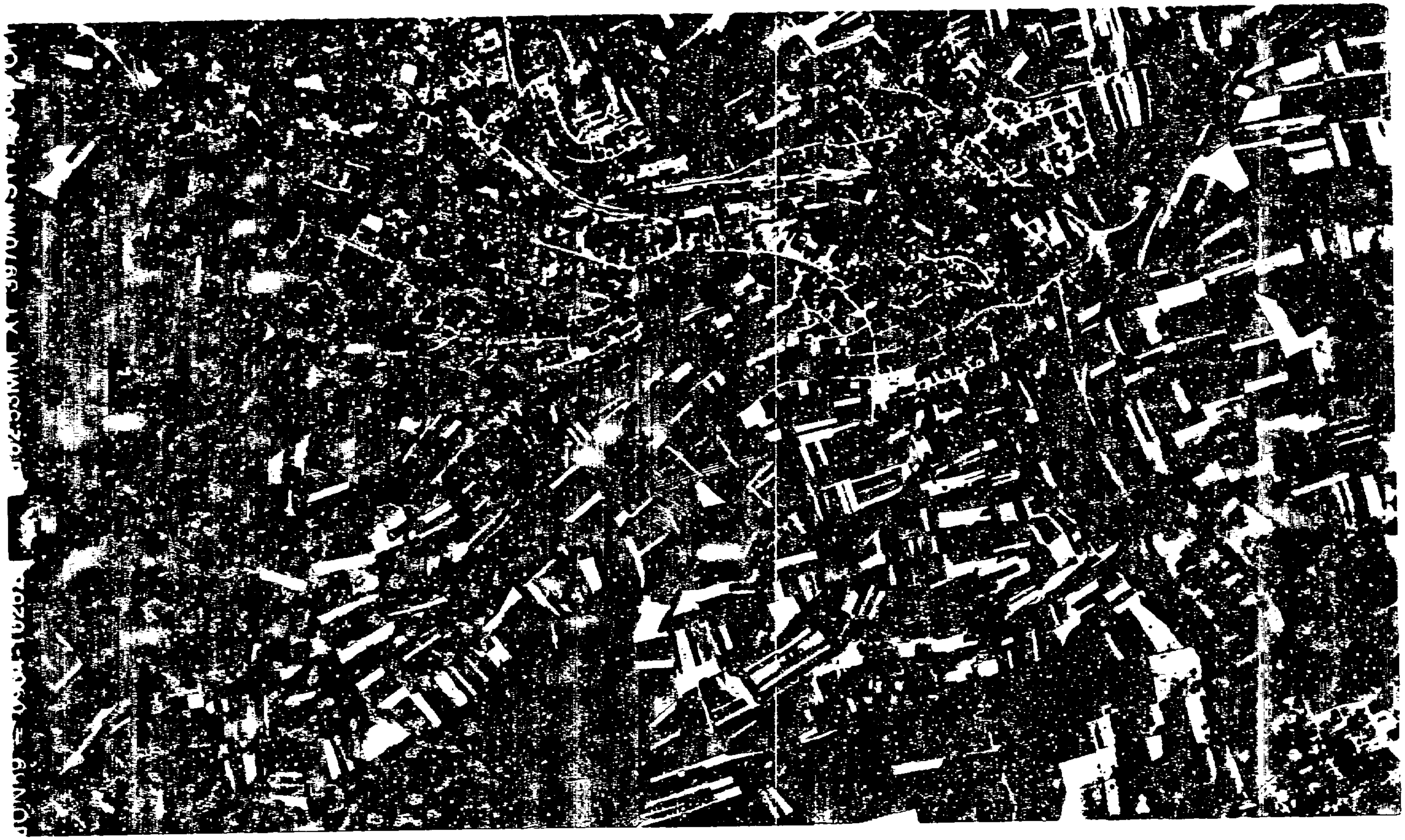


Fig. A2. Location of air photos along transects



Scale 1:24,000

Fig. A3a. Air photo of West Germany transect - east section

Scale 1:24,000

Fig. A3b. Air photo of West Germany transect - middle section

Scale 1:24,000

Fig. A3c. Air photo of West Germany transect - west section

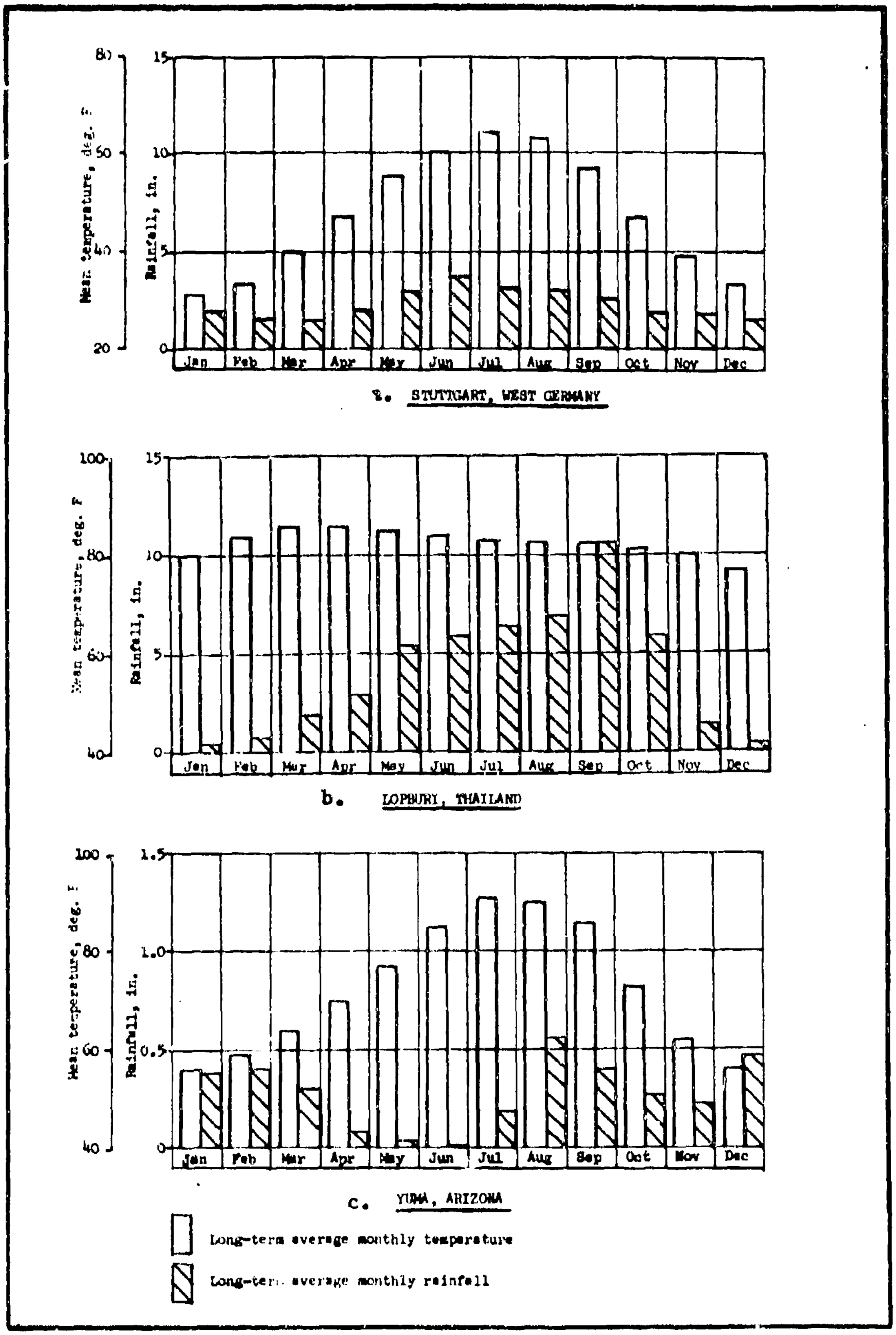


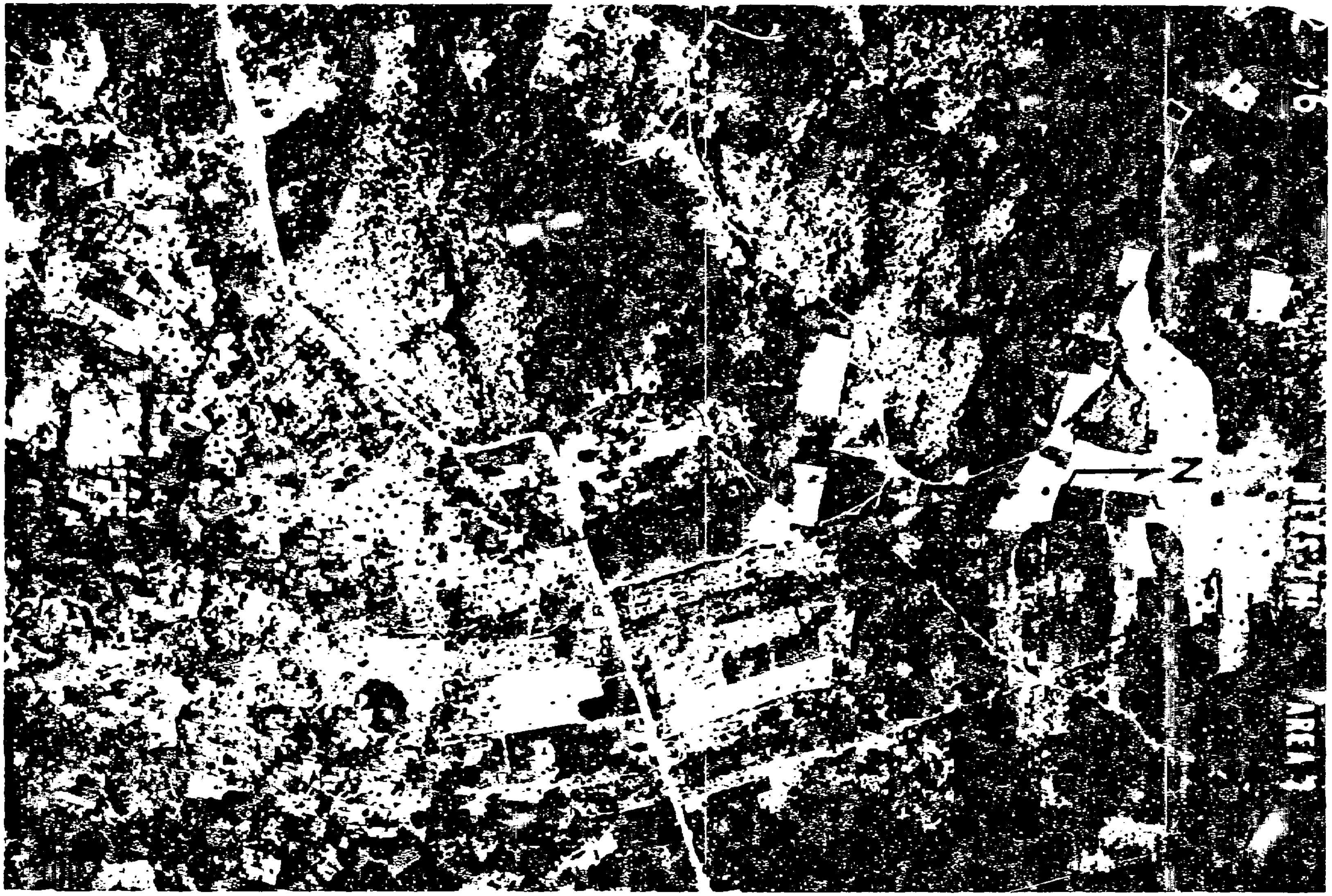
Fig. A4. Monthly rainfall and temperature data

Scale 1:15,000

Fig. A5a. Air photo of Thailand transect - south section

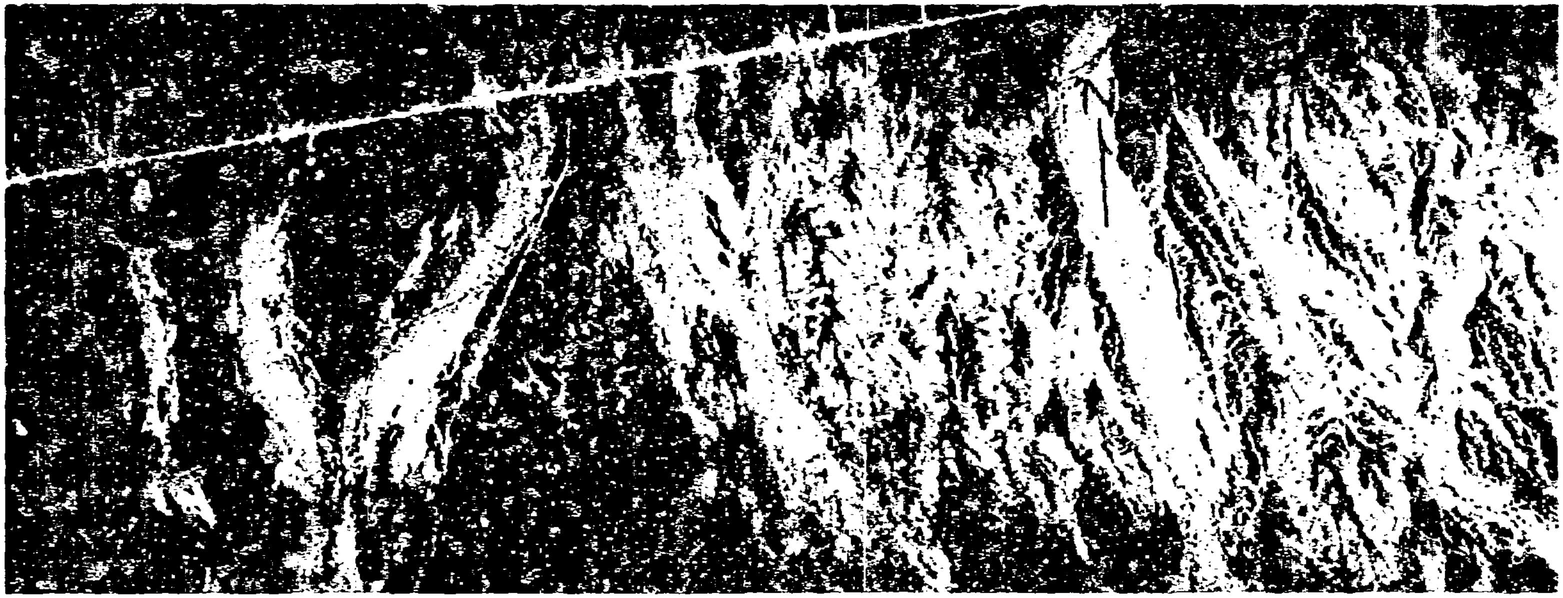
Scale 1:15,000

Fig. A5b. Air photo of Thailand transect - middle section



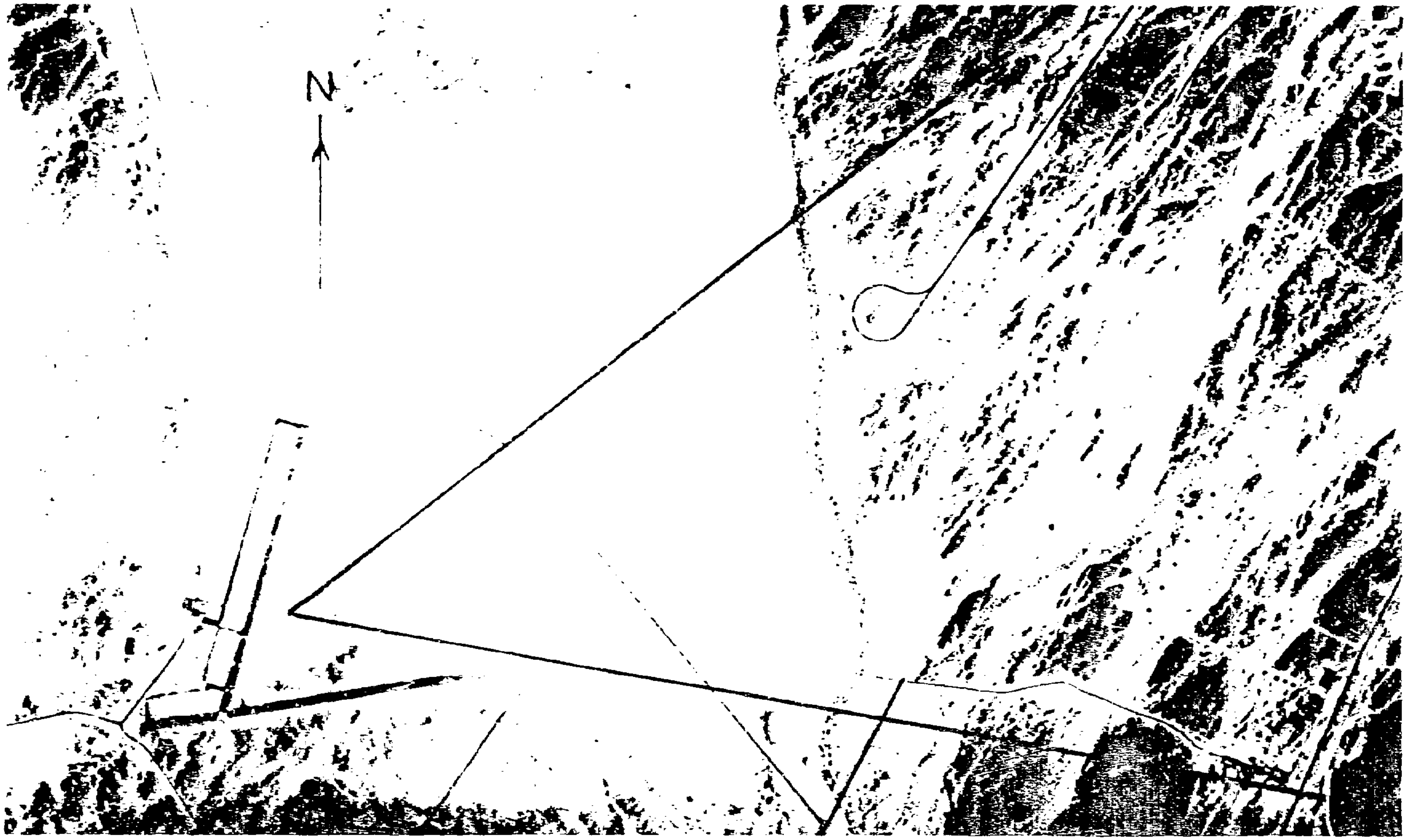
Scale 1:15,000

Fig. A5c. Air photo of Thailand transect - north section



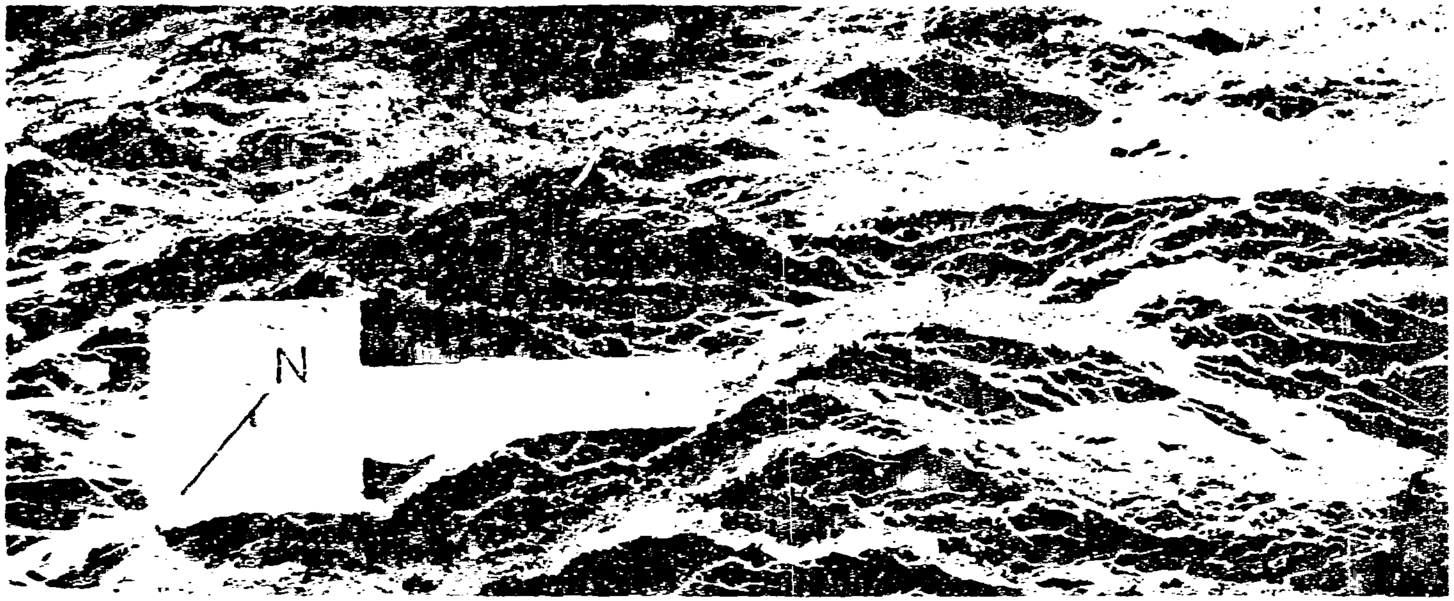
Scale 1:30,000

Fig. A6a. Air photo of Arizona transect - east section



Scale 1:30,000

Fig. A6b. Air photo of Arizona transect - west section



Scale 1:30,000

Fig. A6c. Air photo of Arizona transect - north section

APPENDIX B: TERRAIN AND ROAD DATA

This appendix contains the off-road terrain and on-road data used as input data in modeling mobility. The off-road terrain data consist of descriptions for areal and linear terrain units.

1. AREAL TERRAIN

The terrain factors and terrain factor classes used to describe areal terrain units are given in table B1. Obstacle geometry terms are defined in table B2. Tables B3, B4, and B5 present the data in terms of class for each factor for West Germany, Thailand, and Arizona transects, respectively.

2. LINEAR TERRAIN

The linear terrain data (streams) used in this study are given in table B6 for the West Germany traverse only. Table B7 defines the terrain factors used. Similar data were not available for the Thailand and Arizona traverses.

3. ROAD DATA

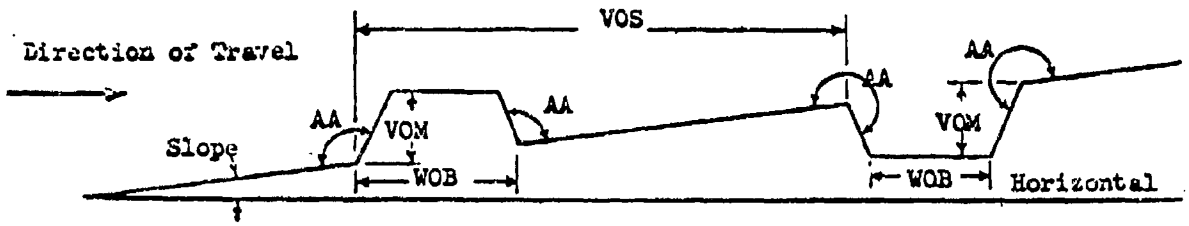
The road factors and road factor classes used to describe primary, secondary, and trial-type road units are given in table B8. Tables B9, B10, and B11 give the road data in terms of class for each factor for West Germany, Thailand, and Arizona road samples within the traverses.

Table B1

Terrain Factors and Terrain Factor Classes Used to Describe Areal Terrain for Ground Mobility

Terrain Factors	Class Numbers: 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Surface Type	Fine Grained Soils	Coarse Grained Soils	[illegible]	Non Permanent Snow	Permanent Snow									
*Surface Strength (CI or RCI) Class Range	>280	221-280	181-220	101-180	61-100	41-60	33-40	26-32	17-25	11-16	0-10	13-25	7-12	0-6
Value Selected for Prediction	>300	250	192	130	80	50	36	29	20	14	5	19	10	3
Slope (%) Class Range	>0-2	2.1-5	5.1-10	10.1-20	20.1-40	40.1-60	60.1-70	>70						
Value Selected for Prediction	>1	3.5	7.5	15.0	30.0	50.0	65.0	72.0						
Obstacle Approach Angle (Deg.) Class Range	178.6-180	180-181.5	175.6-178.5	181.5-184.5	170.1-175.5	184.5-190	150.1-170	190.1-202	149.1-150	202.1-211	135.1-149	211.1-225	90.0-135	226-270
Value Selected for Prediction	179	181	177	183	173	187	164	196	154	206	142	218	112	248
Obstacle Vertical Magnitude (in.) Class Range	0-6	6.1-10	10.1-14	14.1-18.0	18.1-23.6	23.7-33.5	>33.5							
Value Selected for Prediction	3	8	12	16	20	28	33.5							
Obstacle Base Width (in.) Class Range	>47	36-47	24-35	12-24	0-12									
Value Selected for Prediction	242	41	30	18	6									
Obstacle Length (ft) Class Range	0-1	1.1-3.3	3.4-6.6	6.7-10.0	10.1-19.9	20.0-492	>492							
Value Selected for Prediction	.65	2.0	4.9	8.2	14.8	256	492							
Obstacle Spacing (ft) Class Range	Rare	65.7-197.0	36.4-65.6	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Value Selected for Prediction	197.0	131	50.9	31.2	22.3	15.7	10.8	3.9						
Obstacle Spacing Type	Random	Linear												
Surface Roughness Class Range	0-.4	.5-1.5	1.6-2.5	2.6-3.5	3.6-4.5	4.6-5.5	5.6-6.5	6.6-7.5	7.6					
Value Selected for Prediction	.2	1	2	3	4	5	6	7	8					
Stem Diameter (in.)		>1.0	>2.4	>3.9	5.5	7.0	8.7	9.8						
Factor Value	0	1.2	2.4	3.9	5.5	7.0	8.7	9.8						
Stem Spacing (ft) Class Range	Rare	>65.6	36.4-65.6	26.5-36.3	18.3-26.4	13.4-18.2	8.3-13.3	0-8.2						
Value Selected for Prediction	328	65.6	50.9	31.2	22.3	15.7	10.8	3.9						
Visibility (ft) Class Range	>164	79.0-164	39.6-78.9	29.8-39.5	20.0-29.7	15.1-19.9	10.1-15.0	5.1-10.0	0-5.0					
Value Selected for Prediction	164	121	59	34.8	24.9	17.4	12.5	7.5	2.6					
Snow Depth (cm) Class Range	2.5-30.5	30.6-45.7	45.8-61.0	61.1-76.2	76.3-91.4	91.5-121.9	122.0-152.5	152.6-182.9	>182.9					
Value Selected for Prediction	16.5	38.2	53.4	68.6	83.8	106.7	137.2	167.8	182.9					
Snow Moisture Condition	Dry	Wet												

* Surface strength for dry, average, and wet seasons



1. Obstacle approach angles (AA). The angle formed by the inclines at the base of a positive or top of a negative vertical obstacle that a vehicle must sense in surmounting the obstacle.
2. Obstacle base width (WOB). The distance across the bottom of the obstacle.
3. Obstacle spacing (VOS). The horizontal distance between contact edges of vertical obstacles
4. Obstacle vertical magnitude (VOM). The vertical distance from the base of a vertical obstacle to the crest of the obstacle.
5. Obstacle length (VOL). The length of the long axis of the obstacle.

Table B2. Definition of obstacle geometry terms

<< FACTOR ROUGHNESS (>>

<< SOIL >>

<< ... OF >
SIZES EQUAL
TO OR GREATER
THAN GIVEN
DIAMETER,
CENTIMETERS

[illegible]

(Continued)

(1 of 6 sheets)

Table B3 (Continued)

200	1.	1.	2.	4,1,	9,2,4,7,8,2,2,8,2,2,2,2,2,2,2,2
201	1.	1.	2.	4,1,	9,3,4,6,8,1,1,8,2,2,2,2,2,2,2,2
207	1.	1.	2.	4,2,	3,1,5,5,1,1,2,8,2,2,2,2,2,2,2,2
208	1.	1.	2.	4,2,	3,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2
213	1.	1.	2.	4,2,	3,1,5,7,1,2,3,8,2,2,2,2,2,2,2,2
214	1.	1.	2.	4,2,	3,1,5,7,8,2,3,8,2,2,2,2,2,2,2,2
219	1.	1.	2.	4,2,	3,3,5,5,1,1,4,8,2,2,2,2,2,2,2,2
224	1.	1.	2.	4,2,	5,1,3,6,2,1,3,8,2,2,2,2,2,2,2,2
225	1.	1.	2.	4,2,	5,1,3,6,2,1,2,8,3,3,3,2,2,2,2,2
227	1.	1.	2.	4,2,	5,1,3,6,3,1,3,5,3,3,3,2,2,2,2,2
237	1.	1.	2.	4,2,	5,1,5,6,2,1,2,8,3,3,3,2,2,2,2,2
239	1.	1.	2.	4,2,	5,1,5,7,1,2,3,8,2,2,2,2,2,2,2,2
242	1.	1.	2.	4,2,	5,2,3,6,8,1,3,5,2,2,2,2,2,2,2,2
244	1.	1.	2.	4,2,	5,2,2,8,1,1,3,8,3,3,3,2,2,2,2,2
245	1.	1.	2.	4,2,	5,2,3,6,7,1,3,8,3,3,3,2,2,2,2,2
247	1.	1.	2.	4,2,	5,2,5,6,[illegible],2,2,2,2,2,2,2
[illegible]	1.	1.	2.	4,2,	[illegible],3,3,3,2,2,2,2,2
[illegible]	1.	1.	2.	4,2,	[illegible],2,2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1.	[illegible]	[illegible]	[illegible]	[illegible],6,6,5,5,[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],2,2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],5,5,[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],3,3,2,2,2,2,2
[illegible]	1.	1.	[illegible]	[illegible]	[illegible],2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	4,2,	[illegible],2,2,2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],3,2,2,2,2,2
[illegible]	[illegible]	1.	2.	4,2,	[illegible],2,2,2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],7,7,7,6,5,5,5,[illegible]
[illegible]	1.	1.	[illegible]	4,2,	[illegible],2,2,2,2
[illegible]	1.	1.	2.	4,2,	[illegible],2,2,2,2,2
299	1.	1.	2.	4,2,	[illegible],2,4,7,8,2,1,5,4,4,4,2,2,[illegible]
304	1.	1.	2.	4,2,	9,3,4,[illegible],8,1,1,8,2,2,2,2,2,2,2,2
307	1.	1.	2.	4,2,	9,4,1,5,1,1,4,8,7,7,7,6,6,5,5,4
[illegible]	1.	1.	2.	4,2,14,1,5,1,1,1,3,8,2,2,2,2,2,2,2,2	
314	1.	1.	2.	4,2,14,1,5,1,1,1,3,8,3,3,3,2,2,2,2,2	
318	1.	1.	2.	4,2,14,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2	
319	1.	1.	2.	4,2,14,1,5,6,8,1,2,8,2,2,2,2,2,2,2,2	
320	1.	1.	2.	4,2,14,2,5,1,1,1,1,8,2,2,2,2,2,2,2,2	
321	1.	1.	2.	4,2,14,2,5,6,8,1,1,8,2,2,2,2,2,2,2,2	
325	1.	1.	2.	4,2,14,3,5,6,2,1,1,8,3,3,3,2,2,2,2,2	
[illegible]	1.	1.	2.	4,3,	3,1,3,6,1,1,2,8,2,2,2,2,2,2,2,2
333	1.	1.	2.	4,3,	3,1,5,5,1,1,1,8,2,2,2,2,2,2,2,2
336	1.	1.	2.	4,3,	3,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2
343	1.	1.	2.	4,3,	3,1,5,7,8,2,2,8,2,2,2,2,2,2,2,2
344	1.	1.	2.	4,3,	3,2,4,6,8,1,2,8,2,2,2,2,2,2,2,2
348	1.	1.	2.	4,3,	3,2,5,6,1,1,1,8,2,2,2,2,2,2,2,2
350	1.	1.	2.	4,3,	3,2,5,6,1,1,2,8,7,7,7,6,6,5,5,4
354	1.	1.	2.	4,3,	3,3,5,5,1,1,1,8,7,7,7,6,6,5,5,[illegible]
358	1.	1.	2.	4,3,	5,1,3,6,1,1,3,8,2,2,2,2,2,2,2,2
362	1.	1.	2.	4,3,	5,1,3,6,2,1,3,8,2,2,2,2,2,2,2,2
361	1.	1.	2.	4,3,	5,1,3,6,2,1,2,8,3,3,3,2,2,2,2,2
364	1.	1.	2.	4,3,	5,1,3,6,3,1,3,8,2,2,2,2,2,2,2,2
365	1.	1.	2.	4,3,	5,1,3,6,3,1,1,8,3,3,3,2,2,2,2,2
369	1.	1.	2.	4,3,	5,1,4,6,8,1,3,8,2,2,2,2,2,2,2,2
375	1.	1.	2.	4,3,	5,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2
376	1.	1.	2.	4,3,	5,1,5,6,1,1,1,8,3,3,3,2,2,2,2,2
381	1.	1.	2.	4,3,	5,1,5,6,2,1,2,8,3,3,3,2,2,2,2,2
385	1.	1.	2.	4,3,	5,1,5,7,2,2,2,8,2,2,2,2,2,2,2,2
391	1.	1.	2.	4,3,	5,2,3,6,8,1,3,8,2,2,2,2,2,2,2,2
392	1.	1.	2.	4,3,	5,2,5,6,1,1,1,8,2,2,2,2,2,2,2,2
393	1.	1.	2.	4,3,	5,2,3,6,1,1,3,8,3,3,3,2,2,2,2,2
395	1.	1.	2.	4,3,	5,2,5,6,2,1,1,8,2,2,2,2,2,2,2,2
397	1.	1.	2.	4,3,	5,2,5,6,8,1,2,8,2,2,2,2,2,2,2,2
[illegible]	1.	1.	2.	4,3,	5,2,5,6,3,1,1,8,3,3,3,2,2,2,2,2
[illegible]	1.	1.	2.	4,3,	[illegible],2,5,7,2,2,1,8,3,3,3,2,2,2,2,2
[illegible]	1.	1.	2.	4,3,	5,2,5,7,2,2,2,8,7,7,7,6,6,2,2,6
403	1.	1.	2.	4,3,	5,2,5,7,8,2,1,3,4,4,4,4,2,2,2,2
[illegible]	1.	1.	2.	4,3,	5,3,5,6,1,1,2,8,2,2,2,2,2,2,2,2
407	1.	1.	2.	4,3,	5,3,5,6,[illegible],8,3,3,3,2,2,2,2,2
[illegible]	[illegible]	1.	2.	4,3,	[illegible],3,5,5,1,1,3,8,7,7,7,6,6,5,5,4
[illegible]	1.	1.	2.	4,3,	5,3,5,6,2,1,4,8,2,2,2,2,2,2,2,2
[illegible]	1.	1.	2.	4,[illegible]	7,2,5,7,1,2,2,8,2,2,2,2,2,2,2,2
[illegible]	1.	1.	2.	4,3,	7,3,1,5,1,1,1,8,2,2,2,2,2,2,2,2
419	1.	1.	2.	4,3,	7,3,1,5,1,1,2,8,3,3,3,2,2,2,2,2
[illegible]25	1.	1.	2.	4,3,	7,3,1,5,1,1,4,8,7,7,7,6,6,2,2,4
427	1.	1.	2.	4,3,	7,3,1,5,1,1,1,8,7,7,7,6,6,5,5,[illegible]
431	1.	1.	2.	4,3,	7,3,3,7,2,2,2,8,3,3,3,2,2,2,2,2
432	1.	1.	2.	4,3,	7,3,4,7,8,2,3,8,3,3,3,2,2,2,2,2
435	1.	1.	2.	4,3,	7,4,1,5,1,1,4,8,7,7,7,6,6,5,5,4
437	1.	1.	2.	4,3,	9,1,4,6,2,1,1,8,3,3,3,2,2,2,2,2
443	1.	1.	2.	4,3,	9,2,3,6,5,1,1,8,3,3,3,2,2,2,2,2
447	1.	1.	2.	4,3,	9,2,4,6,8,1,1,8,2,2,2,2,2,2,2,2
448	1.	1.	2.	4,3,	9,2,4,6,8,1,2,8,3,3,3,2,2,2,2,2
454	1.	1.	2.	4,3,	9,2,4,7,2,2,2,8,2,2,2,2,2,2,2,2
455	1.	1.	2.	4,3,	9,2,4,7,2,2,4,8,5,5,5,2,2,2,2,2
457	1.	1.	2.	4,3,	9,2,4,7,8,2,2,8,2,2,2,2,2,2,2,2
458	1.	1.	2.	4,3,	9,2,4,7,8,2,2,8,3,3,3,2,2,2,2,2
463	1.	1.	2.	4,3,	9,2,4,7,8,2,3,8,7,7,7,6,6,5,5,4
467	1.	1.	2.	4,3,	9,3,1,5,1,1,1,8,2,2,2,2,2,2,2,2
468	1.	1.	2.	4,3,	9,3,1,5,1,1,2,8,7,7,7,6,6,5,5,4
470	1.	1.	2.	4,3,	9,3,4,6,8,1,2,8,2,2,2,2,2,2,2,2
471	1.	1.	2.	4,3,	9,3,4,6,8,1,3,8,3,3,3,2,2,2,2,2
474	1.	1.	2.	4,3,	9,4,4,6,2,1,6,8,2,2,2,2,2,2,2,2
481	1.	1.	2.	4,3,11,7,1,6,2,1,3,1,1,1,1,1,1,1,1,2	
482	1.	1.	2.	4,3,11,7,1,6,2,1,4,8,2,2,2,2,2,2,2,2	
465	1.	1.	2.	4,3,13,7,1,6,2,1,3,1,1,1,1,1,1,1,1,2	

(Continued)

(2 of 6 sheets)

489 1, 1, 2, 4,2,14,1,4 [illegible] 8,1,1,8,2,2,2,2,2,2,2,2
491 1, 1, 2, 4,2,14,1,5 [illegible] 3,8,2,2,2,2,2,2,2,2
494 1, 1, 2, 4,3,14,1,5 [illegible] 2,2,2,2,2,4
498 1, 1, 2, 4,3,14,1,5,8 [illegible] 2,2,2,2
504 1, 1, 2, 4,2,14,7,1,6,3 [illegible]
511 1, 1, 2, 4,4, 3,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2
515 1, 1, 2, 4,4, 3,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2
524 1, 1, 2, 4,4, 3,1,3,7,1,2,1,8,2,2,2,2,2,2,2,2
527 1, 1, 2, 4,4, 3,2,[illegible],6,1,1,2,8,2,[illegible],2,2,2,2,2
528 1, 1, 2, 4,4, 3,2,4,6,8,1,8,2,2,2,2,2,2,2,2
530 1, 1, 2, 4,4, 3,2,4,[illegible],8,2,1,8,2,2,2,2,2,2,2,2
531 1, 1, 2, 4,4, 3,2,4,7,8,[illegible],7,7,[illegible],6,5,5,4
535 1, 1, 2, 4,4, 3,3,5,6,1,1,1,8,2,2,2,2,2,2,2,2
539 1, 1, 2, 4,4, 3,3,5,6 [illegible] 2,2,2,2,2
541 1, 1, 2, 4,4, 5,1,3,5,1,1,3,8,2,2 [illegible] 2,2,2
543 1, 1, 2, 4,4, 5,1,3,[illegible] 2,2,2,2,2,2,2,2
544 1, 1, 2, 4,4, 5,1,3,6,2,1,1,8,3,3,3,2,2,2,2,2
547 1, 1, 2, 4,4, 5,1,3,6,2,1,1,8,3,3,3,2,2,2,2,2
553 1, 1, 2, 4,4, 5,1,5,5,1,1,2,8,2,2,2,2,2,2,2,2
555 1, 1, 2, 4,4, 5,1,5,5,1,1,2,8,7,2,2,2,2,2,2,2
558 1, 1, 2, 4,4, 5,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2
559 1, 1, 2, 4,4, 5,1,5,6,1,1,3,8,3,3,3,2,2,2,2,2
564 1, 1, 2, 4,4, 5,1,3,6,2,1,2,8,2,2,2,2,2,2,2,2
565 1, 1, 2, 4,4, 5,1,5,6,2,1,[illegible] 7,2,2,2,2
567 1, 1, 2, 4,4, 5,1,5,7 [illegible] 2,1,3,2,2,2,2,2,2,2
568 1, 1, 2, 4,4, 5,1,5,7,2,2,2,8,2,2,2,2,2,2,2,2
569 1, 1, 2, 4,4, 5,1,5 [illegible] 2,2,3,8,3,3,3,2,2,2,2,2
574 1, 1, 2, 4,4, 5,2,3,7,8,2,2,2,2 2,2,2,2,2,2,2
582 1, 1, 2, 4,4, 5,2,5,6,2,1,2,8,3,3,3,2,2,2,2,2
584 1, 1, 2, 4,4, 5,2,5,6,3,1,3 3,2,2,2,2,2,2,2,2
590 1, 1, 2, 4,4, 5,3,3,5,1,1,4,8,2,2,2,2,2,2,2,2
595 1, 1, 2, 4,4, 5,3,5,6,1,1,4,5,2,2,2,2,2,2,2,2
596 1, 1, 2, 4,4, 5,3,5,6,1,1,1,8,5,5,5,2,2,2,2,2
598 1, 1, 2, 4,4, 5,3,5,5,2,1,1,8,3,3,3,2,2,2,2,2
610 1, 1, 2, 4,4, 7,1,3,1,1,1,1,8,2,2,2,2,2,1,2,2
611 1, 1, 2, 4,4, 7,2,3,7,1,2,2,8,2,2,2,2,2,2,2,2
612 1, 1, 2, 4,4, 7,2,1,5,1,2,1,1,1,1,1,1,1,1,2
614 1, 1, 2, 4,4, 7,[illegible],1,2,1,4,8,2 2,1,2,2,2,2,2
616 1, 1, 2, 4,4, 7,2,1,5,1,1,2,8,3,3,3,2,2,2,2,2
632 1, 1, 2, 4,4, 7,3,1,3,1,1,1,8,7,7,7,6,1,2,2,4
634 1, 1, 2, 4,4, 7,3,1,3 2,1,2,8,7,7,7,6,6,5,5,4
638 1, 1, 2, 4,4, 7,3,1, 1,1,4,5,2,2,2,2,2,2,2,2
639 1, 1, 2, 4,4, 7,3,3,5,1,1 3,2,2,2,2,2,2,2,2
641 1, 1, 2, 4,4, 7,3,5,5,1,1,3,8,7,7,7,6,6,5,5,4
652 1, 1, 2, 4,4, 9,1,4,6,1,1,2,8,2,2,2,2,2,2,2,2
655 1, 1, 2, 4,4, 9,2,3,6,5,1,2,8,3,3,3,2,2,2,2,2
670 1, 1, 2, 4,4, 9,2,4,5,2,1,4,3,2,2,2,2,2,2,2,2
672 1, 1, 2, 4,4, 9,2,4,6,8,1,3,8,2,2,2,2,2,2,2,2
674 1, 1, 2, 4,4, 9,2,4,6,2,1,3,8,3,3,3,2,2,2,2,2
677 1, 1, 2, 4,4, 9,2,4,6,8,1,2,8,7,7,7,6,6,5,5,4

679 1, 1, 2, 4,4, 9,2,4,7,2,2,2,8,2,2,2,2,2,2,2,2
681 1, 1, 2, 4,4, 9,2,4,7,8,2,4,5,2,2,2,2,2,2,2,2
682 1, 1, 2, 4,4, 9,2,4,7,8,2,4,8,3,3,3,2,2,2,2,2
684 1, 1, 2, 4,4, 9,2,4,7,8,2,2,8,7,7,7,6,6,5,5,4
692 1, 1, 2, 4,4, 9,3,4,6,8,1,1,8,2,2,2,2,2,2,2,2
694 1, 1, 2, 4,4, 9,4,1,5,1,1,4,8,7,7,7,6,6,5,5,6
697 1, 1, 2, 4,4,11,2,3,6,8,1,2,8,2,2,2,2,2,7,2,2
698 1, 1, 2, 4,4,11,2,3,7,8,2,1,8,3,3,3,2,2,2,2,2
699 1, 1, 2, 4,4,11,3,5,7,8,2,3,8,2,2,2,2,2,2,2,2
700 1, 1, 2, 4,4,11,7,1,6,2,1,5,1,1,1,1,1,1,1,2
701 1, 1, 2, 4,4,14,1,5,1,1,1,3,8,2,2,2,2,2,2,2,2
709 1, 1, 2, 4,4,14,1,5,1,8,1,1,8,2,2,2,2,2,2,2,2
723 1, 1, 2, 4,4,14,7,1,6,3,1,4,1,1,1,1,1,1,1,2
725 1, 1, 2, 4,5, 1,1,5,6,1,1,3,8,2,2,2,2,2,2,2,2
731 1, 1, 2, 4,5, 3,1,5,6,1,1,3,8,2,2,2,2,2,2,2,2
735 1, 1, 2, 4,5, 3,1,5,6,1,1,1,8,7,7,7,6,6,5,5,4
740 1, 1, 2, 4,5, 3,1,5,7,1,2,2,8,2,2,2,2,2,2,2,2
741 1, 1, 2, 4,5, 3,2,4,6,8,1,4,8,2,2,2,2,2,2,2,2
743 1, 1, 2, 4,5, 3,2,4,7,8,2,4,8,2,2,2,2,2,2,2,2
744 1, 1, 2, 4,5, 3,2,5,6,1,1,3,8,2,2,2,2,2,2,2,2
746 1, 1, 2, 4,5, 3,2,5,6,2,1,1,8,3,3,3,2,2,2,2,2
748 1, 1, 2, 4,5, 3,2,5,6,8,1,2,8,3,3,3,2,2,2,2,2
749 1, 1, 2, 4,5, 3,2,5,7,1,2,1,8,2,2,2,2,2,2,2,2
750 1, 1, 2, 4,5, 3,2,5,7,1,2,3,8,3,3,3,2,2,2,2,2
751 1, 1, 2, 4,5, 3,3,5,6,1,1,4,8,2,2,2,2,2,2,2,2
766 1, 1, 2, 4,5, 5,1,5,6,2,1,2,8,3,3,3,2,2,2,2,2
767 1, 1, 2, 4,5, 5,1,5,6,2,1,2,8,7,7,7,6,6,5,5,2
768 1, 1, 2, 4,5, 5,1,5,6,2,1,3,8,7,7,7,6,6,5,5,4
774 1, 1, 2, 4,5, 5,2,3,7,8,2,3,8,2,2,2,2,2,2,2,2
775 1, 1, 2, 4,5, 5,2,3,7,8,2,2,8,3,3,3,2,2,2,2,2
776 1, 1, 2, 4,5, 5,2,5,6,1,1,2,8,2,2,2,2,2,2,2,2
777 1, 1, 2, 4,5, 5,2,5,6,2,1,3,8,2,2,2,2,2,2,2,2
778 1, 1, 2, 4,5, 5,2,5,6,2,1,3,8,3,3,3,2,2,2,2,2
780 1, 1, 2, 4,5, 5,2,5,6,8,1,4,8,2,2,2,2,2,2,2,2
789 1, 1, 2, 4,5, 5,3,4,6,2,1,3,8,3,3,3,2,2,2,2,2
791 1, 1, 2, 4,5, 5,3,5,6,1,1,4,8,2,2,2,2,2,2,2,2
792 1, 1, 2, 4,5, 5,3,5,6,2,1,1,8,2,2,2,2,2,2,2,2
793 1, 1, 2, 4,5, 5,3,5,6,2,1,3,8,3,3,3,2,2,2,2,2
800 1, 1, 2, 4,5 7,2,1,5,1,1,4,8,7,7,4,2,2,2,2,4
801 1, 1, 2, 4,5, 7,2,1,5,1,1,1,8,7,7,4,2,2,2,2,6
804 1, 1, 2, 4,5, 7,2,5,7,1,2,3,8,2,2,2,2,2,2,2,2
806 1, 1, 2, 4,5, 7,3,1,5,1,1,1,8,2,2,2,2,2,2,2,2
819 1, 1, 2, 4,5, 7,3,1,5,1,1,4,8,7,7,7,6,6,5,5,4
821 1, 1, 2, 4,5, 7,3,1,6,1,1,2,8,2,2,2,2,2,2,2,2
829 1, 1, 2, 4,5, 7,3,5,5,1,1,4,8,5,5,5,2,2,2,2,2
830 1, 1, 2, 4,5, 9,1,4,6,1,1,2,8,2,2,2,2,2,2,2,2
832 1, 1, 2, 4,5, 9,1,4,6,2,1,1,8,2,2,2,2,2,2,2,2
833 1, 1, 2, 4,5, 9,1,4,6,2,1,3,8,3,3,3,2,2,2,2,2
834 1, 1, 2, 4,5, 9,1,4,6,2,1,2,8,7,7,7,6,6,5,5,4
838 1, 1, 2, 4,5, 9,2,4,5,8,1,2,8,3,3,3,2,2,2,2,2

(Continued)

(3 of 6 sheets)

Table B3 (Continued)

840	1, 1, 2, 4,5, 9,2,4,6,8,1,4,8,2,2,2,2,2,2,2,2
842	1, 1, 2, 4,5, 9,2,4,6,8,1,4,8,3,3,3,3,3,2,2,2
843	1, 1, 2, 4,5, 9,2,4,6,8,1,3,8,7,7,7,6,2,2,2,4
848	1, 1, 2, 4,5, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
850	1, 1, 2, 4,5, 9,2,4,7,8,2,1,8,4,4,4,4,4,4,4,2
854	1, 1, 2, 4,5, 9,3,4,6,8,1,3,8,2,2,2,2,2,2,2,2
859	1, 1, 2, 4,5, 9,4,4,7,8,2,3,8,3,3,3,2,2,2,2,2
860	1, 1, 2, 4,5,11,2,3,7,8,2,2,8,3,3,3,2,2,2,2,2
861	1, 1, 2, 4,5,11,3,5,7,8,2,3,8,2,2,2,2,2,2,2,2
863	1, 1, 2, 4,5,13,1,4,6,8,1,1,8,2,2,2,2,2,2,2,2
865	1, 1, 2, 4,5,13,7,1,6,2,1,6,1 1,1,1,1,1,1,1,2
868	1, 1, 2, 4,5,14,1,5,1,1,1,1,8,2,2,2,2,2,2,2,2
869	1, 1, 2, 4,5,14,1,5,1,1,1,1,8,3,3,3,2,2,2,2,2
872	1, 1, 2, 4,5,14,1,5,1,1,1,3,8,7,7,7,6,6,5,5,4
877	1, 1, 2, 4,5,14,2,5,1,1,1,3,8,2,2,2,2,2,2,2,2
879	1, 1, 2, 4,5,14,7,1,6,3,1,5,1,1,1,1,1,1,1,1,2
883	1, 1, 2, 4,5, 7,2,4,6,8,1,1,8,2,2,2,2,2,2,2,2
891	1, 1, 2, 4,6, 5,2,5 6,8,1,1,8,2,2,2,2,2,2,2,2
898	1, 1, 2, 4,6, 5,2,5 6,8,1,2,8,2,3,3,2,2 2,2,2
911	1, 1, 2, 4,6, 7,2,1,5,1,1,3,8,7,7,7,6,6,5,5,4
912	1, 1, 2, 4,6, 7,2,1,5,1,1,2,8,2,2,2,2,2,2,2,2
913	1, 1, 2, 4,6, 7,3,1,5,1,1,1,8,7,7,7,6,6,5,5,4
914	1, 1, 2, 4,6, 9,2,4,6,8,1,1,8,2,2,2,2,2,2,2,2
915	1, 1, 2, 4,6, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
916	1, 1, 2, 4,6, 9,2,4,7,8,2,1,8,4,4,4,4,2,2,2,2
919	1, 1, 2, 4,6, 9,3,4,6,8,1,1,8,2,2,2,2,2 2,2,2
922	1, 1, 2, 4,6,11,3,5,7,8,2,2,8,2,2,2,2,2,2,2,2
927	1, 1, 2, 4,7, 5,3,1,5,1,1,1,8,7,7,7,6,6,5,5,4
928	1, 1, 2, 4,7, 7,2,1,5,1,1,3,8,2,2,2,2,2,2,2,2
929	1, 1, 2, 4,7, 7,3,1,5,1,1,3,8,7,7,7,6,6,5,5,4
932	1, 1, 2, 4,7, 9,2,4,6,8,1,1,8,2,2,2,2,2,2,2,2
936	1, 1, 3, 5,1,11,3,1,5,1,1,3,8,7,6,6,6,6,5,5,4
937	1, 1, 3, 5,1,11,3,1,5,1,1,1,8,7,7,7,6,6,5,5,4
939	1, 1, 3, 5,2, 5,1,5,5,1,1,3,8,2,2,2,2,2,2,2,2
940	1, 1, 3, 5,2, 7,3,5,6,1,1,2,8,2,2,2,2,2,2,2,2
941	1, 1, 3, 5,2, 7,3,5,6,1,1,1,6,6,6,6,6,6,5,5,4
942	1, 1, 3, 5,2, 9,2,4,6,8,1 1,8,2,2,2,2,2,2,2,2
943	1, 1, 3, 5,2, 9,2,4,7,8,2 2,8,2,2,2,2,2,2,2,2
944	1, 1, 3, 5,2,11,3,1,5,1,1,4,8,7,6,6,6,6,5,5,4
945	1, 1, 3, 5,2,14,1,5,1,1,1,3,8,2,2,2 2,2,2,2,2
955	1, 1, 3, 5,3, 5,2,5,6,8,1,4,8,2,2,2,2,2,2,2,2
958	1, 1, 3, 5,3, 9,2,4,6,8,1,1,8,2,2,2,2,2,2,2,2
961	1, 1, 3, 5,3, 9,2,4,7,8,2,3,5,2,2,2,2,2,2,2,2
964	1, 1, 3, 5,3,11,3,1,5,1,1,1,8,7,6,6,6,6,5,5,4
966	1, 1, 3, 5,4, 3,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2
968	1, 1, 3, 5,4, 5,1,4,6,6,1,2,8,2,2,2,2,2,2,2,2
969	1, 1, 3, 5,4, 5,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2
971	1, 1, 3, 5,4, 9,2,4,6,8,1,1,8 2,2,2,2,2,2,2,2
973	1, 1, 3, 5,4, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
978	1, 1, 3, 5,5, 7,3,1,5,1,1,3,8,7,7,7,6,6,5,5,4
979	1, 1, 3, 5,5, 9,2,4,6,8,1,3,8,2,2,2,2,2,2,2,2
980	1, 1, 3, 5,5, 9,2,4,7,8,2,2,8,2,2,2,2,2,2,2,2
988	1, 1, 4, 6,1, 9,2,4,6,1,1,3,8,2,2,2,2,2,2,2,2
989	1, 1, 4, 6,1, 9,2,4,6,8,1,4,8,2,2,2,2,2,2,2,2
990	1, 1, 4, 6,1, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
994	1, 1, 4, 6,1,14,1,5,1,1,1,2,8,2,2,2,2,2,2,2,2
998	1, 1, 4, 6,2, 1,1,5,7,8,2,1,8,2,2,2,2,2,2,2,2
999	1, 1, 4, 6,2, 3,1,5,6,1,1,3,8,2,2,2,2,2,2,2,2
1008	1, 1, 4, 6,2, 5,1,3,6,1,1,2,8,2,2,2,2,2,2,2,2
1017	1, 1, 4, 6,2, 5,1,5,6,8,1,1,8,2,2,2,2,2,2,2,2
1019	1, 1, 4, 6,2, 5,1,5,7,2,2,1,8,2,2,2,2,2,2,2,2
1021	1, 1, 4, 6,2, 5,1,5,7,8,2,1,8,2,2,2,2,2,2,2,2
1028	1, 1, 4, 6,2, 5,2,5,7,2,2,2,8,3,3,3,2,2,2,2,2
1029	1, 1, 4, 6,2, 5,2,5,7,8,2,3,8,2,2,2,2,2,2,2,2
1032	1 1, 4, 6,2, 7,3,1,5,1,1,3,8,7,7,7,6,6,5,5,4
1033	1, 1, 4, 6,2, 7,4,4,6,2,1,5,8,2,2,2,2,2,2,2,2
1034	1, 1, 4, 6,2, 7,4,4,6,8,1,6,8,2,2,2,2,2,2,2,2
1042	1, 1, 4, 6,2, 9,1,5,7,2,2,1,8,2,2,2,2,2,2,2,2
1044	1, 1, 4, 6,2, 9,2,3,6,8,1,4,8,2,2,2,2,2,2,2,2
1046	1, 1, 4, 6,2, 9,2,4,6,8,1,4,8,2,2,2,2,2,2,2,2
1047	1, 1, 4, 6,2, 9,2,4,6,8,1,1,8,3,3,3,2,2,2,2,2
1049	1, 1, 4, 6,2, 9,2,4,6,8,1,1,8,4,2,2,2,2,2,2,2
1051	1, 1, 4, 6,2, 9,2,4,6,8,1,3,8,5,5,5,2,2,2,2,2
1052	1, 1, 4, 6,2, 9,2,4,6,8,1,2,8,8,2,2,2,2,2,2,2
1053	1, 1, 4, 6,2, 9,2,4,7,2,2,2,1,1,1,1,1,1,1,1,2
1054	1, 1, 4, 6,2, 9,2,4,7,2,2,1,8,2,2,2,2,2,2,2,2
1056	1, 1, 4, 6,2, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
1057	1, 1, 4, 6,2, 9,2,4,7,8,2,4,8,3,3,3,2,2,2,2,2
1058	1, 1, 4, 6,2, 9,2,4,7,8,2,2,8,4,2,2,2,2,2,2,2
1061	1, 1, 4, 6,2, 9,2,5,7,8,2,4,8,2,2,2,2,2,2,2,2
1063	1, 1, 4, 6,2, 9,3,4,6,8,1,3,8,2,2,2,2,2,2,2,2
1065	1, 1, 4, 6,2, 9,4,4,6,2,1,4,8,2,2,2,2,2,2,2,2
1066	1, 1, 4, 6,2,11,2,2,7,5,2,4,8,2,2,2,2,2,2,2,2
1070	1, 1, 4, 6,2,11,6,5,6,3,1,9,8,2,2,2,2,2,2,2,2
1071	1, 1, 4, 6,2,14,1,5,1,1,1,3,8,2,2,2,2,2,2,2,2
1078	1, 1, 4, 6,2,14,2,5,1,1,1,1,8,2,2,2,2,2,2,2,2
1079	1, 1, 4, 6,2,14,2,5,7,2,2,3,8,4,4,4,2,2,2,2,2
1081	1, 1, 4, 6,2,14,3,5,1,1,1,3,8,2,2,2,2,2,2,2,2
1082	1, 1, 4, 6,3, 1,1,5,7,8,2,2,8,2,2,2,2,2,2,2,2
1083	1, 1, 4, 6,3, 1,1,5,7,8,2,1,8,7,7,7,6,6,5,5,4
1085	1, 1, 4, 6,3, 3,1,5,6,1,1,3,8,2,2,2,2,2,2,2,2
1086	1, 1, 4, 6,3, 3,1,5,6,2,1,3,8,2,2,2,2,2,2,2,2
1087	1, 1, 4, 6,3, 3,1,5,7,1,2,1,8,2,2,2,2,2,2,2,2
1088	1, 1, 4, 6,3, 3,1,5,7,8,2,3,8,2,2,2,2,2,2,2,2
1089	1, 1, 4, 6,3, 3,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
1090	1, 1, 4, 6,3, 3,2,5,6,1,1,4,8,2,2,2,2,2,2,2,2
1094	1, 1, 4, 6,3, 5,1,3,6,2,1,1,8,2,2,2,2,2,2,2,2
1095	1, 1, 4, 6,3, 5,1,3,6,2,1,1,8,3,3,3,2,2,2,2,2
1096	1, 1, 4, 6,3, 5,1,3,7,1,2,1,8,2,2,2,2,2,2,2,2
1099	1, 1, 4, 6,3, 5,1,5,6,1,1,2,8,2,2,2,2,2,2,2,2

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(4 of 6 sheets)

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1241 1, 1, 4, 6,4, 7,3,1,5,1,1,3,8,3,3,3,2,2,2,2,2
1253 1, 1, 4, 6,4, 9,1,4,7,2,2,3,8,2,2,2,2,2,2,2
1255 1, 1  4, 6,4, 9,1,5,1,1,1,2,8,2,2,2,2,2,2,2,2
1256 1, 1, 4, 6,4, 9,1,5,7,2,2,1,8,2,2,2,2,2,2,2
1258 1, 1, 4, 6,4, 9,2,4,5,2,1,3,8,2,2,2,2,2,2,2
1259 1, 1  4, 6,4, 9,2,4,5,5,1,1,8,2,2,2,2,2,2,2
1262 1, 1, 4  6,4, 9,2,4,5,8,1,4,5,3,2,2,2,2,2,2
1264 1, 1, 4, 6,4, 9,2,4,7,2,2,2,8,2,2,2,2,2,2,2
1265 1, 1  4, 6,4, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2
1270 1, 1, 4, 6,4, 9,2,4,9,8,2,2,8,5,2,2,2,2,2,2
1273 1, 1  4, 6,4, 9,2,5,7,2,2,3,5,2,2,2,2,2,2,2
1277 1, 1, 4, 6,4, 9,4,4,7,8,2,5,8,2,2,2,2,2,2,2
1282 1, 1, 4, 6,4,14,1,5,1,1,1,3,5,2,2,2,2,2,2,2
1283 1, 1, 4, 6,4,14,3,5,1,1,1,2,8,2,2,2,2,2,2,2
1289 1, 1, 4, 6,5, 3,1,5,6,1,1,3,8,2,2,2,2,2,2,2
1292 1, 1, 4, 6,5, 3,2,4,6,8,1,7,8,2,2,2,2,2,2,2
1293 1, 1, 4, 6,5, 3,2,4,7,8,2,1,5,2,2,2,2,2,2,2
1294 1, 1, 4, 6,5, 5,1,3,7,2,2,2,8,2,2,2,2,2,2,2
1295 1, 1, 4, 6,5, 5,1,3,7,2,2,2,8,3,3,3,2,2,2,2
1297 1, 1, 4, 6,5, 5,1,5,6,2,1,1,8,2,2,2,2,2,2,2
1299 1, 1, 4, 6,5, 5,1,5,6,2,1,1,8,3,3,3,2,2,2,2
1306 1, 1, 4, 6,5, 5,2,4,6,8,1,3,8,2,2,2,2,2,2,2
1311 1, 1, 4, 6,5, 5,3,5,6,2,1,4,5,2,2,2,2,2,2,2
1317 1, 1, 4, 6,5, 7,4,1,5,1,1,5,8,2,2,2,2,2,2,2
1318 1, 1, 4, 6,5, 7,4,1,5,1,1,1,8,7,7,7,6,6,5,5,4
1320 1, 1, 4, 6,5, 9,1,4,6,1,1,1,8,2,2,2,2,2,2,2
1321 1, 1, 4, 6,5, 9,1,4,5,8,1,3,8,2,2,2,2,2,2,2
1326 1, 1, 4, 6,5, 9,2,4,6,6,1,3,8,2,2,2,2,2,2,2
1330 1, 1, 4, 6,5, 9,2,4,7,8,2,1,8,2,2,2,2,2,2,2
1333 1, 1  4, 6,5, 9,3,1,5,1,1,1,8,2,2,2,2,2,2,2
1337 1, 1, 4, 6,5, 9,4,4,6,1,1,2,8,2,2,2,2,2,2,2
1338 1, 1, 4, 6,5, 9,4,4,7,8,2,2,5,2,2,2,2,2,2,2
1354 1, 1, 4, 6,5,14,1,5,1,1,1,2,8,2,2,2,2,2,2,2
1355 1, 1, 4, 6,7, 9,2,4,6,8,1,2,8,2,2,2,2,2,2,2
1360 1, 1, 4, 6,4, 3,1,5,6,1,1,1,5,2,2,2,2,2,2,2
1361 1, 1, 4, 6,4, 7,3,1,5,1,1,1,8,2,2,2,2,2,2,2
1364 1, 3, 6  7,1, 9,2,4,6,8,1,3,8,2,2,2,2,2,2,2
1365 1, 3, 6, 7,1, 9,2,4,7,8,2,4,3,2,2,2,2,2,2,2
1368 1, 3, 6, 7,2, 3,1,5,6,1,1,3,5,2,2,2,2,2,2,2
1369 1, 3, 6, 7,2, 3,1,5,7,1,2,3,5,2,2,2,2,2,2,2
1370 1, 3, 6, 7,2, 3,1,5,7,8,2,1,5,2,2,2,2,2,2,2
1372 1, 3, 6, 7,2, 9,1,4,5,8,1,3,6,2,2,2,2,2,2,2
1375 1, 3, 6, 7,2, 9,2,4,6,8,1,2,8,2,2,2,2,2,2,2
1376 1, 3, 6, 7,2, 9,2,4,7,8,2,2,8,2,2,2,2,2,2,2
1377 1, 3, 6. 7,2,14,1,5,1,1,1,1,8,2,2,2,2,2,2,2
1380 1, 3, 6, 7,2,14,2,5,6,8,1,1,8,2,2,2,2,2,2,2
1382 1, 3, 6, 7,3, 3,1,5,6,1,1,2,8,2,2,2,2,2,2,2
1384 1, 3, 6, 7,3, 5,1,3,6,2,1,2,8,3,3,3,2,2,2,2
1386 1, 3, 6, 7,3, 9,2,4,6,8,1,2,8,2,2,2,2,2,2,2
1387 1, 3, 6, 7,3, 9,2,4,7,8,2,1,8,2,2,2,2,2,2,2
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Table B3 (Concluded)

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1388 1, 3, 6, 7,3, 9,2,5,6,8,1,4,5,2 2,2,2,2,2,2,2
1392 1, 3, 6, 7,4, 3,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2
1395 1, 3, 6, 7,4, 9,1,4,6,1,1,2,8,2,2,2,2,2,2,2,2
1397 1, 3, 6, 7,4, 9,2,4,6,8,1,3,0,2,2,2,2,2,2,2,2
13[illegible] 1, 3, 6, 7,4, 9,2,4,7,0,2,4,8,2,2,2,2,2,2,2,2
1399 1, 3, 6, 7,5, 3,1,5,6,1,1,2,1,1,1,1,1,1,1,1,2

1402 1, 3, 6, 7,5, 9,1,4,6,1,1,2,8,2,2,2,2,2,2,2,2
1403 1, 3, 6, 7,5, 9,2,4,6,8,1,4,6,2,2,2,2,2,2,2,2
1404 1, 3, 6, 7,5, 9,2,4,7,8,2,3,8,2,2,2,2,2,2,2,2
1405 1, 3, 6, 7,5,14,1,5,1,1,1,2,8,2,2,2,2,2,2,2,2
1407 1, 3, 6, 7,6, 3,1,5,6,1,1,1,8,2,2,2,2,2,2,2,2
```

[illegible] NUMBER OF TERRAIN [illegible] 1

(6 of 6 sheets)

Table B4

Areal Terrain Unit Data for Thailand Traverse

MAP UNIT	SURFACE TYPE	DRY STRENGTH	AVG. STRENGTH	WET STRENGTH	TOPO. SLOPE	APPROACH ANGLE	VERT. MAGNITUDE	BASE WIDTH	LENGTH	SPACING	TYPE	SURFACE ROUGHNESS	[illegible]	2.5	6	10	14	18	22	25	RECOG. DIST.
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
53	1	1	[illegible]	[illegible]	[illegible]	5	[illegible]	5	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7
55	1	1	2	5	1	3	1	[illegible]	7	1	1	2	3	8	2	2	2	2	[illegible]	[illegible]	[illegible]
56	1	1	2	5	1	3	1	3	7	1	2	1	[illegible]	[illegible]	6	4	3	[illegible]	[illegible]	[illegible]	6
57	1	1	2	5	1	3	1	3	7	1	2	1	3	5	6	5	5	5	4	3	2
58	1	1	2	5	1	7	1	3	7	1	2	1	8	5	8	4	2	2	2	2	5

MAP UNIT	SURFACE TYPE	DRY STRENGTH	AVG. STRENGTH	WET STRENGTH	TOPO. SLOPE	APPROACH ANGLE	VERT. MAGNITUDE	BASE WIDTH	LENGTH	SPACING	TYPE	SURFACE ROUGHNESS	[illegible]	2.5	6	10	14	18	22	25	RECOG. DIST.
39	1	1	2	5	1	7	1	[illegible]	1	2	1	2	8	5	5	5	3	3	2	2	8
40	1	1	2	5	1	5	1	5	1	2	1	2	5	[illegible]	2	2	2	2	2	2	7
[illegible]	1	1	2	5	1	7	1	15	1	2	1	3	8	3	5	4	2	2	2	2	8
[illegible]	1	1	2	[illegible]	[illegible]	11	4	1	7	1	2	6	8	3	2	2	2	2	2	2	7
50	1	1	2	3	1	11	4	1	7	1	2	3	[illegible]	8	6	4	3	2	2	2	6
[illegible]	1	1	2	3	[illegible]	11	4	1	7	1	2	3	5	[illegible]	8	4	2	2	2	2	6
[illegible]	1	[illegible]	2	5	1	11	4	2	7	2	2	5	3	8	2	2	2	2	2	2	7
[illegible]	1	[illegible]	2	5	1	11	[illegible]	3	2	[illegible]	[illegible]	1	5	8	2	2	2	2	2	2	7
[illegible]	1	1	2	5	2	[illegible]	1	3	7	[illegible]	2	2	[illegible]	5	[illegible]	5	5	3	2	2	4
[illegible]	1	[illegible]	2	5	2	3	1	3	7	1	2	7	[illegible]	[illegible]	2	2	2	[illegible]	2	2	7
[illegible]	1	[illegible]	[illegible]	5	2	3	[illegible]	3	7	1	[illegible]	1	[illegible]	[illegible]	6	4	3	2	2	2	6
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	3	[illegible]	3	7	1	2	3	[illegible]	6	3	4	2	2	2	2	8
[illegible]	[illegible]	[illegible]	[illegible]	5	2	6	2	4	1	1	1	2	5	8	2	2	2	2	2	2	7
[illegible]	[illegible]	[illegible]	[illegible]	5	2	11	[illegible]	[illegible]	1	2	7	[illegible]	[illegible]	8	2	2	2	2	2	2	7
[illegible]	[illegible]	[illegible]	2	5	[illegible]	11	[illegible]	2	2	[illegible]	[illegible]	5	8	3	7	2	2	2	2	2	7
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	3	2	3	7	2	2	2	7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	2	2	2	7
[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	[illegible]	[illegible]	2	2	[illegible]	2	2	2	7
[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	[illegible]	2	2	2	2	7
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	2	2	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2	2	2	2	3
[illegible]	[illegible]	[illegible]	2	3	[illegible]	11	[illegible]	3	7	1	2	4	3	5	2	2	2	2	2	2	7
[illegible]	[illegible]	[illegible]	2	5	4	[illegible]	[illegible]	3	2	2	1	3	[illegible]	[illegible]	8	4	2	2	2	2	6
115	[illegible]	1	2	3	[illegible]	11	[illegible]	1	7	1	2	2	6	[illegible]	2	2	2	2	2	2	7
118	[illegible]	1	2	3	8	11	[illegible]	3	2	2	1	3	5	6	2	2	2	2	2	2	7
120	1	[illegible]	4	5	1	3	1	3	7	1	2	2	[illegible]	3	2	2	2	2	2	2	7
123	1	[illegible]	[illegible]	5	1	3	1	3	7	1	2	3	5	8	8	5	2	2	2	2	8
125	1	1	4	5	1	5	1	5	1	2	1	3	5	8	2	2	2	2	2	2	7
126	1	[illegible]	4	5	1	5	1	5	1	2	1	2	6	5	5	5	5	3	2	2	5
127	1	1	4	5	1	5	1	5	1	2	1	2	8	5	8	5	5	5	5	5	2
130	1	1	6	5	1	5	1	5	1	2	1	[illegible]	[illegible]	8	8	7	5	5	4	3	5
131	1	1	4	5	1	5	4	5	[illegible]	3	2	2	8	8	2	2	2	2	2	2	7
132	1	1	4	5	1	7	2	4	2	2	1	2	8	5	5	5	3	3	2	2	8
134	1	1	4	5	1	7	2	4	2	2	1	3	[illegible]	8	8	7	[illegible]	5	5	5	4

(Continued)

(1 of 3 sheets)

Table E- (Continued)

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226	1.	1.	4.	5.5,11,4,3,2,2,1,6,3,8,6,4,3,2,2,2,5
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228	1.	1.	4.	5.5,11,4,3,2,2,1,4,8,8,8,7.5,5,4,3,6
229	1.	1.	4.	5,5,11,4,3,7,1,2,6,8,8,2,2,2,2,2,2,7
230	1.	1.	4	5,5,11,4,3,7,1,2,3,8,8,8,7,5,5,4,3,6
233	1.	1.	4.	5,6, 5,1,5,1,2,1,3,8,8,6,4,3,2,2,2,6
235	1	1.	4.	5,6,11,4,1,7,1,2,2,8,8,8,4,2,2,2,2,8
239	1.	1.	4.	5,6,11,4,3,2,2,1,6,8,8,2,2,2,2,2,2,7
[illegible]	[illegible]	1.	4.	5,6,11,4,3,2,2,1,1,8,8,6,4,3,2,2,2,6
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[illegible]	[illegible]	1.	4.	5,9,11,4,3,7,1,2 4,8,6,5,7,5,5,4,3,6
245	1	1.	5.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
310	1.	2.	6.	6,1,11,4,2,7,2,2,6,8,8,6,4,3,2,2,2,6
313	1.	2.	6.	6,1,11,4,2,7,2,2,6,8,8,8,4,2,2,2,2,8
314	1.	2	6.	6,1,11,4,2,7,2,2,6,8,8,8,7,5,5,4,3,6

(Continued)

(2 of 3 sheets)

Table E-4 (Concluded)

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393 1, 5, 6, 7,1, 3,1,3,7,1,2,2,8,8,2,2,2,2,2,2,7
394 1, 5, 6, 7,1, 3,1,[illegible],7,1,2,1,8,8,6,4,3,2,2,2,8
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399 1, 5, 6, 7,1, 3,2,4,2,2,1,2,8,8,2,2,2,2,2,2,7
400 1, 5, 6, 7,1, 3,2,4,2,2,1,4,8,5,6,5,5,4,4,3,5
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[illegible] 1, 5, 6, 7,1,11,4,2,7,2,2,1,8,8,2,2,2,2,2,2,7
454 1, 5, 6, 7,1,11,4,[illegible],7,2,2,3,5,5,5,4,3,2,2,2,6
[illegible] 1, 5, 6, 7,1,11,4,2,7,[illegible],2,[illegible],8,5,2,2,2,2,8
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462 1, 5, 6, 7,1,11,4,2,7,2,2,4,3,8,8,8,8,7,6,5,4
465 1, 5, 6, 7,1,11,4,2,7,1,2,5,8,8,2,2,2,2,2,2,7
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453 1, 5, 6, 7,1,11,[illegible],1,7,2,2,3,8,5,2,2,2,2,2,2,7
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473 1, 5, 6, 7,1,11,6,3,7,2,2,5,8,5,2,2,2,2,2,2,7
475 1, 5, 6, 7,1,11,7,2,7,2,2,2,5,8,2,2,2,2,2,2,7
477 1, 5, 6, 7,1,13,4,1,4,1,1,3,3,2,2,2,2,2,2,2,7
478 1, 5, 6, 7,1,13,4,2,7,2,2,3,6,8,2,2,2,2,2,2,7
479 1, 5, 6, 7,3,11,2,4,2,2,1,2,8,5,2,2,2,2,2,2,7
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(3 of 3 sheets)

Table 55

Areal Terrain Unit Data for Arizona Traverse

<<<<<<<<<<<<<<< FACTOR COMPLEX >>>>>>>>>>>>>>>

<< SOIL >> · < OBSTACLE > · SURFACE ROUGHNESS · << SPACING OF STEMS EQUAL TO OR GREATER THAN GIVEN DIAMETER, CENTIMETERS >> · RECOG. DIST.

MAP UNIT	Values (as printed)
[illegible]	[illegible]
59	2, 1, 1, 1,1,10,4,1,6,3,1,5,2,2,2,2,2,2,2,2,2
60	2, 1, 1, 1,1,10,4,1,6,3 [illegible]
61	2, 1, 1, 1,1,10,4,1,6,3,1 [illegible] 2,2,2,2,2,2

MAP UNIT	Values (as printed)
[illegible]	2, 1, 1, 1,1,10,4,1,6,3,1,1,4,4,2,2,2,2,2,2,2
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[illegible]	1,1,10,4,1,6,3,1 [illegible] 5,4,2,2,2,2,2,2,2
[illegible]	2, [illegible] 1,10,4,1,6,3 [illegible] 5,4,3,2,2,2,2,2,2
[illegible]	[illegible] 5,5,3,2,2,2,2,2,2
[illegible]	[illegible] 5,5,4,2,2,2,2,2,2
[illegible]	[illegible] 5,5,3,2,2,2,2,2,2
[illegible]	[illegible] 5,6,5,4,2,2,2,2,2,2
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[illegible]	[illegible] 5,6,4,2,2,2,2,2,2
[illegible]	[illegible] 5,6,5,2,2,2,2,2,2
[illegible]	[illegible] 5,7,6,5,2,2,2,2,2,2
[illegible]	[illegible] 1,1,1,1,1,1,1,1,2
[illegible]	2, [illegible] 2,2,2,2,2,2,2,2,?
[illegible]	[illegible] 2,4,3,2,2,2,2,2,2
[illegible]	[illegible] 3,7,6,5,2,2,2,2,2,2
[illegible]	[illegible] 3,1,1,1,1,1,1,1,2
[illegible]	[illegible] 9,4,1,6,1,1,8,1,1,1,1,1,1,1,2
[illegible]	[illegible] 4,1,6,2,1,1,2,2,2,2,2,2,2,2,2
[illegible]	[illegible] 5,5,4,3,2,2,2,2,2,2
[illegible]	[illegible] 2,2,2,2,2,2,2,2,2
[illegible]	[illegible] 5,5,4,3,2,2,2,2,2
[illegible]	[illegible] 5,5,2,2,2,2,2,2
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[illegible]	[illegible] 3,2,2,2,2,2,2,2
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100	2, 1, 1, 1,1,10,4,1,6,2,1,2,4,2,2,2,2,2,2,2,2
101	2, 1, 1, 1,1,10,4,1,6,2,1,4,4,3,2,2,2,2,2,2,2
102	2, 1, 1, 1,1,10,4,1,6,2,1,4,4,3,3,2,2,2,2,2,2
104	2, 1, 1, 1,1,10,4,1,6,2,1,6,4,4,3,2,2,2,2,2,2
105	2, 1, 1, 1,1,10,4,1,6,2,1,3,4,4,4,2,2,2,2,2,2
107	2, 1, 1, 1,1,10,4,1,6,2,1,5,5,3,2,2,2,2,2,2,2
[illegible]	2, 1, 1, 1,1,10,4,1,6,2,1,1,5,4,2,2,2,2,2,2,2
[illegible]	2, 1, 1, 1,1,10,4,1,6,2,1,4,5,4,3,2,2,2,2,2,2

(Continued)

(1 of 3 sheets)

Table B5 (Continued)

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114	2,	1,	1,	1,1,10,4,1,6,2,1,5,5,5,4,2,2,2,2,2,2
115	2,	1,	1,	1,1,10,4,1,6,2,1,7,5,4,2,2,2,2,2,2,2
116	2,	1,	1,	1,1,10,4,1,6,2,1,3,6,4,3,2,2,2,2,2,2
117	2,	1,	1,	1,1,10,4,1,6,2,1,5,6,5,2,2,2,2,2,2,2
118	2,	1,	1,	1,1,10,4,1,6,2,1,4,6,5,3,2,2,2,2,2,2
119	2,	1,	1,	1,1,10,4,1,6,2,1,2,6,5,4,2,2,2,2,2,2
120	2,	1,	1,	1,1,10,4,1,6,2,1,5,6,5,5,2,2,2,2,2,2
121	2,	1,	1,	1,1,10,4,1,6,2,1,4,6,6,4,2,2,2,2,2,2
122	2,	1,	1,	1,1,10,4,1,6,2,1,9,6,6,5,2,2,2,2,2,2
123	2,	1,	1,	1,1,10,4,1,6,2,1,8,7,5,4,2,2,2,2,2,2
124	2,	1,	1,	1,1,10,4,1,6,2,1,5,7,6,4,2,2,2,2,2,2
125	2,	1,	1,	1,1,10,4,1,6,2,1,9,7,6,5,2,2,2,2,2,2
126	2,	1,	1,	1,1,10,4,1,6,2,1,8,7,6,6,2,2,2,2,2,2
127	2,	1,	1,	1,1,10,4,1,6,3,1,6,1,1,1,1,1,1,1,1,2
128	2,	1,	1,	1,1,10,4,1,6,3,1,3,2,2,2,2,2,2,2,2,2
129	2,	1,	1,	1,1,10,4,1,6,3,1,9,7,3,2,2,2,2,2,2,2
130	2,	1,	1,	1,1,10,4,1,6,3,1,8,4,4,2,2,2,2,2,2,2
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135	2,	1,	1,	1,1,10,4,1,6,3,1,8,5,5,3,2,2,2,2,2,2
137	2,	1,	1,	1,1,10,4,1,6,3,1,4,6,6,4,2,2,2,2,2,2
138	2,	1,	1,	1,1,10,4,1,6,3,1,3,6,6,5,2,2,2,2,2,2
139	2,	1,	1,	1,1,10,4,1,6,4,1,1,1,1,1,1,1,1,1,1,2
140	2,	1,	1,	1,1,10,4,1,6,4,1,9,2,2,2,2,2,2,2,2,2
141	2,	1,	1,	1,1,10,4,1,6,4,1,3,5,4,2,2,2,2,2,2,2
142	2,	1,	1,	1,1,10,4,1,6,4,1,8,4,3,2,2,2,2,2,2,2
143	2,	1,	1,	1,2, 9,4,1,6,2,1,3,1,1,1,1,1,1,1,1,2
144	2,	1,	1,	1,2, 9,4,1,6,2,1,6,2,2,2,2,2,2,2,2,2
145	2,	1,	1,	1,2, 9,4,1,6,2,1,4,4,3,2,2,2,2,2,2,2
147	2,	1,	1,	1,2, 9,4,1,6,2,1,5,5,3,2,2,2,2,2,2,2
148	2,	1,	1,	1,2, 9,4,1,6,2,1,5,5,4,2,2,2,2,2,2,2
150	2,	1,	1,	1,2, 9,4,1,6,2,1,7,6,6,2,2,2,2,2,2,2
151	2,	1,	1,	1,2, 9,4,1,6,2,1,4,6,5,2,2,2,2,2,2,2
152	2,	1,	1,	1,2, 9,4,2,2,4,1,7,2,2,2,2,2,2,2,2,2
154	2,	1,	1,	1,2, 9,4,1,6,1,1,4,3,2,2,2,2,2,2,2,2
156	2,	1,	1,	1,2,10,4,1,6,3,1,4,1,1,1,1,1,1,1,1,2
157	2,	1,	1,	1,2,10,4,1,6,3,1,7,2,2,2,2,2,2,2,2,2
158	2,	1,	1,	1,2,10,4,1,6,3,1,6,3,3,2,2,2,2,2,2,2
160	2,	1,	1,	1,2,10,4,1,6,3,1,6,3,3,4,2,2,2,2,2,2
163	2,	1,	1,	1,2,10,4,1,6,3,1,7,5,5,2,2,2,2,2,2,2
164	2,	1,	1,	1,2,10,4,1,6,3,1,2,5,5,3,2,2,2,2,2,2
165	2,	1,	1,	1,2,10,4,1,6,3,1,4,5,5,4,2,2,2,2,2,2
167	2,	1,	1,	1,2,10,4,1,6,3,1,9,6,5,4,2,2,2,2,2,2
168	2,	1,	1,	1,2,10,4,1,6,3,1,5,6,6,4,2,2,2,2,2,2
169	2,	1,	1,	1,2,10,4,1,6,3,1,7,6,6,5,2,2,2,2,2,2
170	2,	1,	1,	1,2, 9,4,4,1,4,1,3,1,1,1,1,1,1,1,1,2
171	2,	1,	1,	1,2, 9,4,1,6,1,1,2,1,1,1,1,1,1,1,1,2
172	2,	1,	1,	1,2, 9,4,1,6,2,1,3,4,4,3,2,2,2,2,2,2
177	2,	1,	1,	1,2,10,4,1,6,2,1,7,1,1,1,1,1,1,1,1,2
178	2,	1,	1,	1,2,10,4,1,6,2,1,8,2,2,2,2,2,2,2,2,2
179	2,	1,	1,	1,2,10,4,1,6,2,1,5,3,2,2,2,2,2,2,2,2
180	2,	1,	1,	1,2,10,4,1,6,2,1,6,3,3,2,2,2,2,2,2,2
181	2,	1,	1,	1,2,10,4,1,6,2,1,6,4,2,2,2,2,2,2,2,2
182	2,	1,	1,	1,2,10,4,1,6,2,1,7,4,4,3,2,2,2,2,2,2
185	2,	1,	1,	1,2,10,4,1,6,2,1,1,5,4,3,2,2,2,2,2,2
187	2,	1,	1,	1,2,10,4,1,6,2,1,7,5,5,4,2,2,2,2,2,2
190	2,	1,	1,	1,2,10,4,1,6,2,1,6,6,5,4,2,2,2,2,2,2
192	2,	1,	1,	1,2,10,4,1,6,2,1,7,6,6,4,2,2,2,2,2,2
193	2,	1,	1,	1,2,10,4,1,6,2,1,2,6,6,5,2,2,2,2,2,2
197	2,	1,	1,	1,2,10,4,1,6,3,1,1,1,1,1,1,1,1,1,1,2
207	2,	1,	1,	1,2,10,4,1,6,3,1,5,5,5,4,2,2,2,2,2,2
212	2,	1,	1,	1,2,10,4,1,6,3,1,2,6,6,5,2,2,2,2,2,2
213	2,	1,	1,	1,3, 9,4,1,6,2,1,2,1,1,1,1,1,1,1,1,2
204	2,	1,	1,	1,3, 9,4,1,6,2,1,7,2,2,2,2,2,2,2,2,2
209	2,	1,	1,	1,3, 9,4,1,6,2,1,4,5,4,3,2,2,2,2,2,2
211	2,	1,	1,	1,3, 9,4,1,6,2,1,1,5,5,4,2,2,2,2,2,2
214	2,	1,	1,	1,3, 9,4,1,6,2,1,7,6,6,4,2,2,2,2,2,2
215	2,	1,	1,	1,3, 9,4,1,6,2,1,4,6,6,5,2,2,2,2,2,2
222	2,	1,	1,	1,3,10,4,1,6,3,1,2,1,1,1,1,1,1,1,1,2
223	2,	1,	1,	1,3,10,4,1,6,3,1,9,2,2,2,2,2,2,2,2,2
224	2,	1,	1,	1,3,10,4,1,6,3,1,9,3,3,2,2,2,2,2,2,2
226	2,	1,	1,	1,3,10,4,1,6,3,1,8,4,4,2,2,2,2,2,2,2
227	2,	1,	1,	1,3,10,4,1,6,3,1,9,4,4,3,2,2,2,2,2,2
228	2,	1,	1,	1,3,10,4,1,6,3,1,6,4,4,4,2,2,2,2,2,2
230	2,	1,	1,	1,3,10,4,1,6,3,1,4,5,4,3,2,2,2,2,2,2
231	2,	1,	1,	1,3,10,4,1,6,3,1,4,5,5,3,2,2,2,2,2,2
232	2,	1,	1,	1,3,10,4,1,6,3,1,3,5,5,4,2,2,2,2,2,2
235	2,	1,	1,	1,3,10,4,1,6,3,1,5,6,5,4,2,2,2,2,2,2
236	2,	1,	1,	1,3,10,4,1,6,3,1,9,6,6,4,2,2,2,2,2,2
237	2,	1,	1,	1,3,10,4,1,6,3,1,6,6,6,5,2,2,2,2,2,2
238	2,	1,	1,	1,3,10,4,1,6,4,1,3,1,1,1,1,1,1,1,1,2
239	2,	1,	1,	1,3,10,4,1,6,4,1,8,6,4,3,2,2,2,2,2,2
240	2,	1,	1,	1,3, 9,4,4,1,4,1,1,1,1,1,1,1,1,1,1,2
241	2,	1,	1,	1,3, 9,4,1,6,1,1,3,1,1,1,1,1,1,1,1,2
242	2,	1,	1,	1,3, 9,4,1,6,1,1,7,6,6,5,2,2,2,2,2,2
244	2,	1,	1,	1,3,10,4,1,6,2,1,5,1,1,1,1,1,1,1,1,2
245	2,	1,	1,	1,3,10,4,1,6,2,1,2,2,2,2,2,2,2,2,2,2
246	2,	1,	1,	1,3,10,4,1,6,2,1,6,3,2,2,2,2,2,2,2,2
247	2,	1,	1,	1,3,10,4,1,6,2,1,8,3,3,2,2,2,2,2,2,2
250	2,	1,	1,	1,3,10,4,1,6,2,1,1,5,4,2,2,2,2,2,2,2
251	2,	1,	1,	1,3,10,4,1,6,2,1,1,5,4,3,2,2,2,2,2,2
254	2,	1,	1,	1,3,10,4,1,6,2,1,2,5,5,4,2,2,2,2,2,2
256	2,	1,	1,	1,3,10,4,1,6,2,1,6,6,5,4,2,2,2,2,2,2
257	2,	1,	1,	1,3,10,4,1,6,2,1,9,6,5,5,2,2,2,2,2,2
258	2,	1,	1,	1,3,10,4,1,6,2,1,6,6,6,4,2,2,2,2,2,2
259	2,	1,	1,	1,3,10,4,1,6,2,1,6,6,6,5,2,2,2,2,2,2
261	2,	1,	1,	1,3,10,4,1,6,2,1,8,7,6,4,2,2,2,2,2,2
262	2,	1,	1,	1,3,10,4,1,6,2,1,6,7,6,5,2,2,2,2,2,2

(Continued)

(2 of 3 sheets)

Table [illegible] (Concluded)

(3 of 3 sheets)

Table B6

Linear Terrain Data Used for West Germany Traverse Predictions

Linear Terrain Unit	Differential Bank Height (BD)	Ingress Angle** Deg	Egress Angle† Deg	Water Depth (WD)	Water Width (RW)	Water Velocity (WS)	Calculated Severity Factor	Occurrences In Sample
6	0	15	15	0.5	7.5	0	0.11	4
9	0	15	15	1.5	7.5	0	0.33	6
10	0	25	25	1.5	10.5	0	0.88	9
11	0.5	25	15	1.5	10.5	0	0.33	1
12	0.5	15	25	1.5	10.5	0	1.17	3
13	0	25	25	1.5	10.5	0	0.88	8
14	0	25	25	1.5	13.5	0.5	0.88	9
15	0	35	35	3.5	19.5	0.5	3.78	6
17	1.5	15	25	1.5	10.5	0	1.76	2
19	1.5	15	25	1.5	13.5	0.5	1.76	1
21*	1.5	25	35	3.5	19.5	0.5	5.40	1
22	0	35	35	3.5	22.5	0.5	3.78	4
23*	0	45	45	3.5	25.5	0.5	5.74	1
28*	3.0	45	35	3.5	25.5	0.5	3.78	1
36	0	7.5	7.5	0.5	1.5	0	0.03	1
41	0	25	25	0.5	4.5	0	0.29	2
44	0	25	25	1.5	4.5	0	0.88	18
45	0	35	35	1.5	7.5	0	1.62	8
46	0.5	35	25	1.5	7.5	0	0.88	1
48	0	35	35	1.5	7.5	0	1.62	5
49	0	35	35	1.5	10.5	0.5	1.62	7
50*	0	45	45	3.5	13.5	0.5	5.74	3
51	1.5	35	25	1.5	7.5	0	0.88	1
52*	1.5	25	35	1.5	7.5	0	3.24	2
54*	1.5	35	25	1.5	10.5	0.5	3.24	2

* Eliminated from final speed evaluations per 4.1(1).

** (180° - THI) in Table B7.

† (180° - RBA) in Table B7.

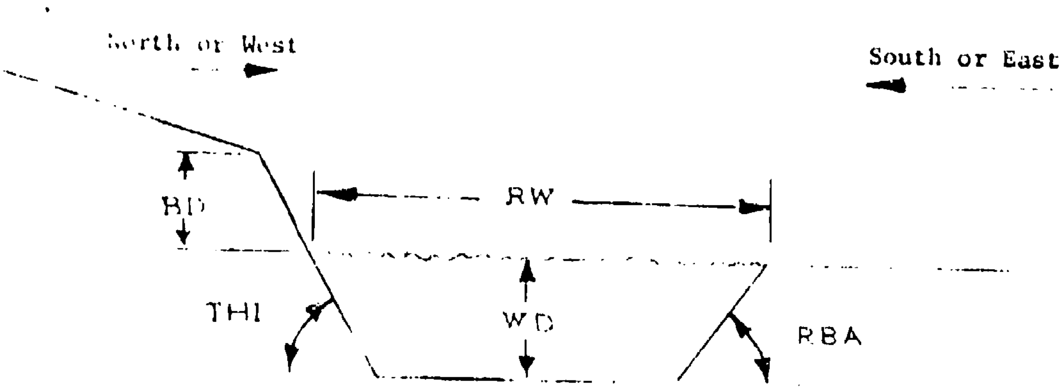
(1 of 2 sheets)

Table F (Concluded)

Linear Terrain Unit	Differential Bank Height (BD)	Ingress Angle Deg	Egress Angle Deg	Water Depth (WD)	Water Width (RW)	Water Velocity (WS)	Caluculated Severity Factor	Occurrences In Sample
55*	1.5	25	35	3.5	13.5	0.5	3.78	1
59*	0	75	75	3.5	25.5	0.5	10.71	1
60*	0	82.5	82.5	3.5	28.5	0.5	11.28	1
61*	3.0	35	60	3.5	22.5	0.5	16.77	2
71*	1.5	82.5	45	3.5	62.5	1.5	5.14	2
73*	3.0	75	25	3.5	122.5	1.5	2.05	1
75*	3.0	87.5	25	3.5	62.5	1.5	2.05	1
77*	1.5	75	25	3.5	72.5	1.5	2.93	1
79*	1.5	45	75	3.5	87.5	1.5	15.30	1
80*	3.0	45	45	3.5	72.5	1.5	5.74	2
81*	0	87.5	87.5	1.5	10.5	0.5	4.91	5
							TOTAL	124

(2 of 2 sheets)

Table B7
Hydrologic Geometry Terms



1. Differential Bank Height (BD) - The difference in elevation of the two banks.

2. Top Side Slope (THI, RBA) - The angle formed by the bounding incline at the top of the hydrologic feature. The angle is measured with respect to the horizontal.

3. Water Depth (WD) - Maximum depth of water in channel.

4. Water Width (RW) - The width of the stream at water level

5. Water Velocity (WS) - The maximum velocity of water in a channel

Table B8

Road Factors and Road Factor Classes Used to Describe Roads for Ground Mobility

ROAD FACTORS	Class Numbers 1	2	3	4	5	6	7	8	9	10	11
ROAD TYPE	Paved*	Secondary**	Trails								
SURFACE STRENGTH											
A. CI or RCI											
CLASS RANGE	>280	221-280	161-220	101-160	61-100						
VALUE SELECTED FOR PREDICTION	300	250	190	130	80						
SLOPE (%)											
CLASS RANGE	>0-2	2.1-5	5.1-7	7.1-10	10.1-14	14.1-20	20.1-27	27.1-35			
VALUE SELECTED FOR PREDICTION	>1	3.5	6.0	8.5	12.0	17.0	23.5	31.0			
SURFACE ROUGHNESS (RMS ELEV, in.)											
CLASS RANGE	0-.4	.5-1.5	1.6-2.5	2.6-3.5							
VALUE SELECTED FOR PREDICTION	.2	1	2	3							
CURVATURE (DEGREES)											
CLASS RANGE	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-15	15.1-20	20.1-30	30.1-40	40.1-60	60.1-80
VALUE SELECTED FOR PREDICTION	1	3	5	7	9	12.5	17.5	25	35	50	70

* Surface Strength not considered
Used 40-lb. per ton motion resistence

** Surface Strength not considered
Used 70-lb. per ton motion resistence

Table B9

Road Unit Data for West Germany

Primary Roads

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
1	1	1	1	1	1	1	34.3
2	1	1	1	1	1	2	31.7
3	1	1	1	1	1	3	15.3
4	1	1	1	1	1	4	5.5
5	1	1	1	1	1	5	4.1
6	1	1	1	1	1	6	0.6
7	1	1	1	1	1	7	9.4
8	1	1	1	1	1	8	1.5
9	1	1	1	1	1	9	4.4
10	1	1	1	1	1	10	2.6
11	1	1	1	1	1	11	9.7
12	1	1	1	2	1	1	6.5
13	1	1	1	2	1	2	7.4
14	1	1	1	2	1	3	1.9
15	1	1	1	2	1	4	2.1
16	1	1	1	2	1	5	2.3
17	1	1	1	2	1	7	1.3
18	1	1	1	2	1	8	0.1
19	1	1	1	2	1	9	1.9
20	1	1	1	2	1	10	0.4
21	1	1	1	2	1	11	3.1
22	1	1	1	3	1	1	4.0
23	1	1	1	3	1	2	4.5
24	1	1	1	3	1	3	2.0
25	1	1	1	3	1	5	1.7
26	1	1	1	3	1	6	0.6
27	1	1	1	3	1	7	1.4
28	1	1	1	3	1	8	0.4
29	1	1	1	3	1	9	0.5
30	1	1	1	3	1	10	1.5
31	1	1	1	3	1	11	2.5

(Continued)

Table B9 (Continued)

Secondary Roads

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
32	2	3	1	1	1	1	19.3
33	2	3	1	1	1	2	12.3
34	2	3	1	1	1	3	6.4
35	2	3	1	1	2	4	4.3
36	2	3	1	1	2	5	4.3
37	2	3	1	1	2	6	1.3
38	2	3	1	1	1	7	5.1
39	2	3	1	1	1	8	1.7
40	2	3	1	1	1	9	3.4
41	2	3	1	1	2	10	3.7
42	2	3	1	1	2	11	7.2
43	2	3	1	2	1	1	9.3
44	2	3	1	2	2	2	4.7
45	2	3	1	2	1	3	4.4
46	2	3	1	2	2		2.6
47	2	3	1	2	1	5	3.3
48	2	3	1	2	2	6	1.9
49	2	3	1	2	2	7	3.9
50	2	3	1	2	2	8	2.1
51	2	3	1	2	1	9	3.2
52	2	3	1	2	1	10	1.8
53	2	3	1	2	2	11	3.7
54	2	3	1	3	1	1	2.4
55	2	3	1	3	2	2	0.7
56	2	3	1	3	2	3	1.2
57	2	3	1	3	1	5	1.2
58	2	3	1	3	2	6	0.3
59	2	3	1	3	1	7	0.7
60	2	3	1	3	2	8	0.2

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
61	2	3	1	3	2	9	0.7
62	2	3	1	3	1	10	0.5
63	2	3	1	3	1	11	0.9
64	2	3	1	4	2	1	0.7
65	2	3	1	4	1	2	2.6
66	2	3	1	4	1	3	1.5
67	2	3	1	4	1	4	1.6
68	2	3	1	4	2	5	0.5
69	2	3	1	4	1	6	0.5
70	2	3	1	4	2	7	0.7
71	2	3	1	4	1	8	0.6
72	2	3	1	4	2	9	0.1
73	2	3	1	4	1	10	0.6
74	2	3	1	4	2	11	0.5
75	2	3	1	5	1	1	0.2
76	2	3	1	5	1	4	0.2
77	2	3	1	5	2	7	0.1
78	2	3	1	5	2	8	0.2
79	2	3	1	6	2	1	0.3
80	2	3	1	6	2	2	0.2
81	2	3	1	7	1	3	0.1
82	2	3	1	7	2	10	0.1
83	2	3	1	7	2	11	0.2

(Continued)

(2 of 3 sheets)

Table B9 (Concluded)

Trails

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
84	3	5	5	1	3	1	20·6
85	3	5	5	1	4	1	4·2
86	3	5	5	1	3	2	2·9
87	3	5	5	1	3	3	11·7
88	3	5	5	1	1	4	31·8
89	3	5	5	1	2	5	31·2
90	3	5	5	1	1	7	23·6
91	3	5	5	1	3	9	16·4
92	3	5	5	1	3	11	39·0
93	3	5	4	2	2	1	5·1
94	3	5	4	2	4	1	8·7
95	3	5	4	2	1	1	0·4
96	3	5	4	2	4	2	1·1
97	3	5	4	2	2	2	18·2
98	3	5	4	2	3	3	14·6
99	3	5	4	2	4	4	55·2
100	3	5	4	2	4	5	100·0
101	3	5	4	2	1	7	84·1
102	3	5	4	2	2	9	13·2
103	3	5	4	2	3	11	108·8
104	3	5	4	3	2	1	0·7
105	3	5	4	3	3	2	6·3
106	3	5	4	3	3	3	3·2
107	3	5	4	3	2	4	19·5
108	3	5	4	3	4	5	16·4

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
109	3	5	4	3	1	7	37·9
110	3	5	4	3	4	9	4·7
111	3	5	4	3	4	11	45·5
112	3	5	3	4	2	1	12·6
113	3	5	3	4	3	1	1·8
114	3	5	3	4	1	2	7·2
115	3	5	3	4	2	3	5·4
116	3	5	3	4	1	4	19·0
117	3	5	3	4	3	5	28·9
118	3	5	3	4	2	7	30·7
119	3	5	3	4	3	9	4·2
120	3	5	3	4	2	11	52·5
121	3	5	3	5	4	1	0·5
122	3	5	3	5	2	1	2·2
123	3	5	3	5	4	5	4·3
124	3	5	3	5	1	7	5·6
125	3	5	3	5	1	11	6·9
126	3	5	3	6	3	1	0·9
127	3	5	3	6	4	5	4·7
128	3	5	3	6	3	7	10·6
129	3	5	3	6	3	9	0·7
130	3	5	3	6	2	11	8·3
131	3	5	3	7	3	7	2·0
132	3	5	3	7	4	11	1·8
133	3	5	3	8	3	11	1·6

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Table B10

Road Unit Data for Thailand

Primary Roads

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
1	1	1	1	1	1	1	100.6
2	1	1	1	1	1	2	3.1
3	1	1	1	1	1	3	3.5
4	1	1	1	1	1	4	1.7
5	1	1	1	1	1	5	0.2
6	1	1	1	1	1	6	0.6
7	1	1	1	1	1	5	0.4
8	1	1	1	1	1	9	0.8
9	1	1	1	1	1	11	0.8
10	1	1	1	2	1	1	0.3
11	1	1	1	2	1	4	0.8

Secondary Roads

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
12	2	3	1	1	1	1	41.9
13	2	3	1	1	2	1	41.9
14	2	3	1	1	2	2	6.1
15	2	3	1	1	2	3	3.7
16	2	3	1	1	2	4	3.3
17	2	3	1	1	2	5	3.6
18	2	3	1	1	2	6	1.7
19	2	3	1	1	1	7	0.8
20	2	3	1	1	1	8	0.3
21	2	3	1	1	1	9	0.9
22	2	3	1	1	2	11	2.9
23	2	3	1	2	2	3	0.5
24	2	3	1	2	1	11	0.2

(Continued)

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Table B10 (Concluded)

Trails

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
25	3	5	5	1	2	1	62.5
26	3	5	5	1	3	1	62.5
27	3	5	5	1	3	2	52.5
28	3	5	5	1	4	3	51.6
29	3	5	5	1	3	4	21.3
30	3	5	5	1	3	5	62.7
31	3	5	5	1	3	6	7.7
32	3	5	5	1	1	7	21.6
33	3	5	5	1	2	8	16.2

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
34	3	5	5	1	1	9	41.5
35	3	5	5	1	3	10	6.0
36	3	5	5	1	3	11	34.7
37	3	5	4	2	2	1	0.6
38	3	5	4	2	4	2	1.0
39	3	5	4	2	1	5	0.6
40	3	5	4	2	4	9	0.2
41	3	5	4	3	2	5	0.2
42	3	5	4	3	3	11	0.2

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Table B11

Road Unit Data for Arizona

Primary Roads: Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
1	1	1	1	1	1	1	94.5
2	1	1	1	1	1	2	14.0
3	1	1	1	1	1	3	5.7
4	1	1	1	1	1	4	5.3
5	1	1	1	1	1	5	2.5
6	1	1	1	1	1	6	1.7
7	1	1	1	1	1	7	0.3
8	1	1	1	1	1	8	0.2
9	1	1	1	1	1	10	1.0
10	1	1	1	1	1	11	7.6
11	1	1	1	2	1	1	2.2
12	1	1	1	2	1	2	0.3
13	1	1	1	2	1	4	0.2

Secondary Roads: Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
14	2	3	1	1	1	1	42.0
15	2	3	1	1	2	1	49.0
16	2	3	1	1	2	2	13.2
17	2	3	1	1	2	3	6.0
18	2	3	1	1	2	4	1.2
19	2	3	1	1	2	5	3.8
20	2	3	1	1	2	6	0.5
21	2	3	1	1	1	7	1.9
22	2	3	1	1	1	8	1.2
23	2	3	1	1	1	10	0.7
24	2	3	1	1	2	11	6.5
25	2	3	1	2	2	1	1.5
26	2	3	1	2	1	2	1.3
27	2	3	1	2	2	3	0.7
28	2	3	1	2	1	4	0.4
29	2	3	1	2	2	7	0.6
30	2	3	1	4	1	8	0.3

(Continued)

(1 of 2 sheets)

Table B11 (Concluded)

Trails

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
31	3	6	1	1	2	1	78.4
32	3	6	1	1	3	1	78.4
33	3	6	1	1	3	2	58.3
34	3	6	1	1	4	3	30.8
35	3	6	1	1	3	4	11.8
36	3	6	1	1	3	5	14.9
37	3	6	1	1	3	6	4.6
38	3	6	1	1	1	7	10.0
39	3	6	1	1	2	8	8.9
40	3	6	1	1	1	9	3.6
41	3	6	1	1	3	10	3.8
42	3	6	1	1	3	11	22.0
43	3	6	1	2	2	1	3.4
44	3	6	1	2	4	2	4.6
45	3	6	1	2	1	3	1.0

Map Unit No.	Road Type	Surface Type	Surface Strength	Slope	Surface Roughness	Curvature	Length in Sample, km
46	3	6	1	2	4	4	2.1
47	3	6	1	2	2	5	1.8
48	3	6	1	2	3	6	0.5
49	3	6	1	2	4	7	2.5
50	3	6	1	2	4	8	2.1
51	3	6	1	[illegible]	1	11	1.3
52	3	6	1	3	2	1	0.4
53	3	6	1	3	3	2	0.6
54	3	6	1	3	2	6	0.2
55	3	6	1	3	3	7	0.5
56	3	6	1	3	3	10	0.3
57	3	6	1	4	2	3	0.2
58	3	6	1	5	4	2	0.2
59	3	6	1	6	1	2	0.5
60	3	6	1	6	4	7	0.1

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APPENDIX C: VEHICLE DATA

Data required for each vehicle as input to the AMC-71 mobility model are contained in the following tables:

Table C1 - Values of vehicle characteristics used. In this table, the vehicles are identified by numbers as given in table 10 or table C7

Table C2 - Transmission gear ratios, vehicle characteristic No. 49 in table C1

Table C3 - Torque converter characteristics, vehicle characteristics No. 55 and 57 in table C1

Table C4 - Tractive force-speed or engine speed-engine torque relations, vehicle characteristic No. 59 in table C1

Table C5 - Obstacle height-speed relations, vehicle characteristic No. 61 in table C1

Table C6 - Ride-speed relations, vehicle characteristic No. 63 in table C1

Table C7 - Maximum speed limits used in study

Table C8 - Vehicle characteristics used in dynamics submodels

Vehicle Characteristics

No.	Identification	Dimensions	1	2	3	4	5	6	7
1	Vehicle type (NVEH = 0 for tracked and 1 for wheeled)	--	1	1	1	1	1	1	1
2	Gross vehicle weight	kips	3.2	4	3.2	4	4.3	5.2	4.
3	Track type (NFL = 0 for nonflexible and 1 for flexible)	in.	NA	NA	NA	NA	NA	NA	NA
4	Grouser height for tracks; number of tires for wheeled tire ply rating	--	4	4	4	4	6	6	6
5	Tire ply rating	--	6	6	6	6	6	6	6
6	Gross rated horsepower	bhp	71	111	71	111	71	111	71
7	Number of people in vehicle on normal mission	--	2	2	2	2	2	2	2
8	Winch capacity (use 0 for no winch)	kips	0	0	0	0	0	0	0
9	Number of tracks or tires	--	4	4	4	4	6	6	6
10	Number of axles	--	2	2	2	2	3	3	3
11	Vehicle width	in.	64	70	64	70	64	70	6[illegible]
12	Vehicle length	in.	133	165	133	165	236	268	2[illegible]
13	Track width or nominal tire width	in.	7	6	7	6	7	6	7
14	Wheel rim diameter	in.	16	16	16	16	16	16	1[illegible]
15	Recommended tire pressure (highway)	psi	23	45	23	45	23	45	2[illegible]
16	Recommended tire pressure (cross-country)	psi	20	20	20	20	20	20	2[illegible]
17	Area of one track shoe (tracked) or number of wheels (wheeled)	in.^{2}	4	4	4	4	4	4	4
18	Number of bogies (tracked) or chain indicator wheeled (0 = no chains, 1 = chains)	--	0	0	0	0	0	0	0
19	Maximum vertical step the vehicle can climb	in.	--	--	--	--	--	--	
20	Vehicle ground clearance at the center of greatest wheel span	in.	12	12	12	12	12	12	1[illegible]
21	Minimum vehicle ground clearance	in.	9	9	9	9	9	9	[illegible]
22	Rear end clearance (vertical clearance of vehicle trailing edge)	in.	18	17	18	17	18	17	1[illegible]
23	Vehicle departure angle	deg	37	26	37	26	37	26	[illegible]
24	Vertical clearance of vehicle's leading edge	in.	18	18	18	18	18	18	1[illegible]
25	Vehicle approach angle	deg	66	43	66	43	66	43	[illegible]
26	Length of track on ground or wheel diameter	in.	30	28	30	28	30	28	[illegible]
27	Height of vehicle pushbar	in.	18	18	18	18	18	18	[illegible]
28	Distance between first and last wheel center lines	in.	85	100	85	100	85	100	[illegible]
29	Horizontal distance from the center of gravity to the front wheel center lines	in.	45	50	45	50	45	50	[illegible]
30	Vertical distance from the center of gravity to the road wheel center lines	in.	10	10	10	10	10	10	[illegible]
31	Maximum span between adjacent wheel center lines	in.	85	100	85	100	85	100	
32	Angle between a line parallel to the ground surface and the line connecting the center of gravity and the center of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle	deg	NA	NA	NA	NA	NA	NA	
33	Distance from the center of gravity to the center of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle	in.	NA	NA	NA	NA	NA	NA	
34	Vertical distance from the ground to the center of the rear wheel (road wheel or idler)	in.	14	13	14	13	14	13	

	2	3	4	5	6	7	8	9	10	11	12	13
	1	1	1	1	1	1	1	1	1	1	[illegible]	[illegible]
2	4	3.2	4	4.3	6.2	4.3	[illegible]	2	[illegible]	[illegible]	[illegible]	[illegible]
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	4	4	4	6	[illegible]	6	6	4	4	[illegible]	4	4
	6	6	6	[illegible]	6	6	6	4	8	8	8	[illegible]
	111	71	111	71	111	71	111	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	2	2	2	2	2	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0	0	0	0	0	0	0	0	0	0	0	[illegible]
	4	4	4	[illegible]	[illegible]	[illegible]	[illegible]	4	4	4	4	[illegible]
	2	2	2	3	3	3	3	2	2	2	[illegible]	[illegible]
	70	64	70	64	70	64	70	60	73	73	[illegible]	[illegible]
3	165	133	165	[illegible]	208	[illegible]	208	118	[illegible]	[illegible]	[illegible]	[illegible]
	6	7	6	7	[illegible]	7	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]
	16	16	16	16	16	16	16	12	16	16	[illegible]	20
	45	23	45	23	45	23	45	12	40	40	27	[illegible]
	20	20	20	20	20	20	20	12	40	40	7	[illegible]
	4	4	4	4	4	4	4	4	4	4	4	4
	0	0	0	0	0	0	0	0	0	0	0	0
-	--	--	--	--	--	--	--	--	--	--	--	--
	12	12	12	12	12	12	12	15	[illegible]	[illegible]	15	[illegible]
	9	9	9	[illegible]	9	9	[illegible]	8	11	11	10	[illegible]
	17	18	17	18	17	18	17	11	22	22	[illegible]	40
	26	37	[illegible]	37	[illegible]	37	[illegible]	34	32	[illegible]	[illegible]	[illegible]
	18	18	18	18	18	18	18	27	24	24	19	[illegible]
	43	66	43	[illegible]	43	[illegible]	[illegible]	40	44	44	[illegible]	[illegible]
	28	30	28	30	28	30	28	[illegible]	34	34	34	[illegible]
	18	18	18	18	18	18	18	27	24	24	[illegible]	[illegible]
	100	85	100	[illegible]	100	85	100	57	112	112	[illegible]	[illegible]
	50	45	50	45	50	45	50	[illegible]	57	57	81	[illegible]
	10	10	10	10	10	10	10	12	13	[illegible]	15	[illegible]
	100	85	100	[illegible]	100	[illegible]	100	57	112	112	[illegible]	[illegible]
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	13	14	13	14	13	14	13	11	[illegible]	16	[illegible]	[illegible]

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MC-71 Ground Mobility Model

Vehicle Number																							
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9.8	11.2	9.8	18.8	14.5	18.8	24.5	22.2	20.2	24.5	31.8	25.2	17.[illegible]	31.8	44.5	37.9	30.3	44.5	43.2	58.9	[illegible]1.8	51.8	58.9	96.6
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	6	6	10	6	10	12	12	8	12	10	8	10	10	12	10	12	12	4	14	14	14	14	14
8	8	8	8	10	8	8	8	8	8	12	10	10	12	12	10	10	12	10	12	12	10	12	20
140	116	140	140	131	140	140	140	131	140	250	210	225	250	250	210	225	250	213	250	335	230	250	300
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	6	6	10	6	10	12	12	8	12	10	8	10	10	12	10	12	12	4	14	14	14	14	14
3	3	3	3	2	3	4	4	3	4	3	4	3	3	4	5	4	4	2	5	5	5	5	5
79	85	79	96	90	96	96	96	90	96	97	96	95	97	97	9[illegible]	95	97	108	97	97	97	97	115
352	352	352	264	234	264	424	528	394	424	301	276	244	301	505	480	448	505	375	538	480	484	538	624
8	9	8	9	8	9	9	9	8	9	11	16	9	11	11	1[illegible]	9	11	15	11	11	11	11	14
16	16	16	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	33	20	20	20	20	24
60	27	30	57	70	57	57	57	70	57	75	30	70	75	75	30	70	75	40	70	70	70	70	55
27	27	27	40	40	40	40	40	40	40	35	30	30	35	35	30	30	35	27	35	40	40	35	25
4	4	4	10	6	10	10	10	6	10	10	8	10	10	10	8	10	10	4	10	10	10	10	10
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
--	--	--	18	--	18	18	18	--	18	--	27	--	--	--	27	--	--	--	--	--	--	--	--
11	19	11	19	13	19	19	19	13	19	23	20	22	2[illegible]	23	20	22	23	2[illegible]	23	24	18	23	2[illegible]
8	10	[illegible]	11	10	11	11	11	10	11	11	12	10	11	11	12	10	11	24	12	11	11	12	1[illegible]
12	2[illegible]	12	32	26	32	32	32	26	32	27	52	28	27	27	52	28	27	31	32	30	30	32	35
13	25	13	40	25	40	40	40	25	40	32	[illegible]	42	32	32	[illegible]	42	32	37	70	75	44	70	75
15	19	15	29	18	29	29	29	18	29	34	38	24	34	34	38	24	34	48	32	21	30	32	43
28	45	28	48	36	48	48	48	36	48	46	55	56	46	4[illegible]	55	[illegible]	4[illegible]	35	45	46	[illegible]	45	52
32	34	32	38	36	38	38	48	36	[illegible]	42	44	38	42	42	44	38	42	[illegible]	42	42	42	42	62
15	19	15	29	18	29	29	29	18	29	34	38	24	34	34	38	24	34	48	32	21	30	32	43
131	12[illegible]	131	178	151	178	178	178	151	[illegible]	[illegible]	20[illegible]	188	206	206	206	188	206	235	194	177	175	194	211
83	81	83	101	109	101	101	101	109	101	101	110	103	101	101	110	103	101	76	87	114	107	87	148
15	15	15	25	25	25	25	25	25	25	1[illegible]	15	1[illegible]	19	19	15	19	19	11	13	13	13	13	18
131	126	131	130	151	130	130	130	151	130	152	90	138	152	152	90	138	152	235	140	127	125	140	151
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	1[illegible]	15	18	17	18	18	18	17	18	1[illegible]	21	18	19	1[illegible]	21	18	19	33	19	19	19	19	23

34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1
7.6	31.8	44.5	37.9	30.3	44.5	43.2	58.9	51.8	51.8	58.9	96.6	82	179	166	23.4	26.5	104	3.5	3.2	14
IA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	1	1	NA	NA	NA
.0	10	12	10	12	12	4	14	14	14	14	14	14	24	24	1	1	1.5	4	4	8
.0	12	12	10	10	12	10	12	12	10	12	20	10	22	18	NA	NA	NA	6	6	6
25	250	250	210	225	250	213	250	335	230	250	300	318	600	525	202	202	750	70	71	184
2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	3	2	2	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.0	10	12	10	12	12	4	14	14	14	14	14	14	24	24	2	2	2	4	4	8
3	3	4	5	4	4	2	5	5	5	5	5	5	8	8	NA	NA	NA	2	2	4
5	97	97	97	95	97	108	97	97	97	97	115	115	120	120	105	106	143	60	64	9?
44	301	505	480	448	505	375	538	489	484	538	624	624	732	741	192	227	273	139	165	[illegible]
0	11	11	1?	9	11	18	11	11	11	11	14	11	18	18	15	15	28	7	7	14
10	20	20	20	20	20	33	20	20	20	20	24	20	22	22	NA	NA	NA	23	23	18
70	75	75	30	70	75	40	70	70	70	70	55	70	90	90	NA	NA	NA	20	20	30
30	35	35	30	30	35	27	35	40	40	35	25	35	45	45	NA	NA	NA	4	4	20
10	10	10	8	10	10	4	10	10	10	10	10	10	8	8	90	90	194	4	4	8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	12	0	0	0
--	--	--	27	--	--	--	--	--	--	--	--	--	12	--	--	24	--	--	--	--
12	23	23	20	22	23	29	23	24	18	23	25	25	17	16	NA	NA	NA	11	12	20
10	11	11	12	10	11	24	12	11	11	12	16	9	11	11	16	16	18	8	9	13
28	27	27	52	28	27	31	32	30	30	32	35	35	43	36	16	23	40	16	18	29
32	32	32	64	42	32	37	70	75	44	70	75	61	82	68	23	35	43	34	37	70
24	34	34	38	24	34	48	32	21	30	32	43	35	40	36	40	50	45	20	18	35
26	46	46	55	56	46	35	45	46	66	45	52	35	20	26	30	57	90	66	66	50
08	42	42	44	38	42	69	42	42	42	42	52	42	46	46	105	120	171	30	30	46
14	34	34	38	24	34	48	32	21	30	32	43	35	40	36	30	50	45	20	18	35
188	206	206	206	188	206	235	194	177	175	194	213	207	224	236	106	111	167	81	85	177
103	101	101	110	103	101	76	87	114	107	87	148	140	124	129	52	93.5	109	49	45	98
19	19	19	15	19	19	11	13	13	13	13	18	18	20	20	24	13	36	10	10	25
138	152	152	90	138	152	235	140	127	125	140	151	157	106	132	NA	NA	NA	81	85	77
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18	13.8	25.9	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	74	84	110	NA	NA	NA
18	19	19	21	18	19	33	19	19	19	19	23	19	21	21	15	16	18	14	14	21.5

(1 of 2 sheets)

Vehicle Characteristics								
No.	Identification	Dimensions	1	2	3	4	5	6
35	Track thickness plus the radius of the rear wheel (road wheel or idler). The wheel is the one used to determine departure angle. (wheeled RW)	in.	14	13	14	13	14	13
36	Rolling radius of tire or sprocket pitch radius	in.	14	13	14	13	14	13
37	Height of rigid point used to determine approach angle	in.	18	18	18	18	18	18
38	Maximum braking force the vehicle develops	--	0.8	0.8	0.8	0.8	0.8	0.8
39	Loaded wheel radius	in.	14	13	14	13	14	13
40	Total ground contact area	$in.^2$	NA	NA	NA	NA	NA	NA
41	Distance vehicle spans before significant motion begins	in.	15	14	15	14	15	14
42	Maximum force the pushbar can withstand	kips	3.2	4	3.2	4	3.2	4
43	Maximum axle load/gross vehicle weight	--	0.5	0.5	0.5	0.5	0.5	0.5
44	Vehicle rated horsepower per ton	hp/ton	44	55	44	55	33	43
45	Transmission type (0 = automatic; 1 = manual)	--	1	1	1	1	1	1
46	Final drive gear ratio	--	4.86	4.27	4.86	4.27	4.86	4.27
47	Final drive gear efficiency	--	0.9	0.96	0.9	0.96	0.9	0.96
48	Number of gears in transmission	--	4	6	4	6	4	6
49	Gear ratios for transmission	--						
50	Transmission efficiency	--	0.9	0.96	0.9	0.96	0.9	0.96
51	Gear ratio from engine to torque converter	--	NA	NA	NA	NA	NA	NA
52	Denotes presence of a torque converter lockup (No = 0, Yes = 1)	--	NA	NA	NA	NA	NA	NA
53	Input torque at which the torque converter curves were measured	--	NA	NA	NA	NA	NA	NA
54	Number of point pairs in array TME1 (see item 55)	--	NA	NA	NA	NA	NA	NA
55	Array containing torque converter input speed versus converter torque ratio curve	--	NA	NA	NA	NA	NA	NA
56	Number of point pairs in array TTM (see item 57)	--	NA	NA	NA	NA	NA	NA
57	Array containing torque converter torque multiplying coefficient versus converter speed ratio curve	--	NA	NA	NA	NA	NA	NA
58	Number of point pairs in array TTF (see item 59)	--	19	13	19	13	19	13
59	Array containing net engine torque versus engine speed curve	--						
60	Number of point pairs in array VOOB (see item 61)	--	23	29	23	29	23	29
61	Array containing vehicle velocity versus obstacle height at 2.5-g vertical acceleration	--						
62	Number of points in array VRIDE (see item 63)	--	6	8	6	8	9	9
63	Array containing ride dynamics versus speed curve							
64	Vehicle swimming speed	mph	0	0	0	0	0	0
65	Vehicle fording speed	mph	2	2	2	2	2	2
66	Auxiliary water propulsion factor (0.5 = No, 0.8 = Yes)	--	0.5	0.5	0.5	0.5	0.5	0.5
67	Ingress swamp angle of the vehicle	deg	60	60	60	60	60	60
68	Fording depth or draft height	in.	21	13	21	13	21	13
69	Recommended tire pressure (sand)	psi	15	15	15	15	15	15

* See Table 3.

Dimensions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
in.	14	13	14	13	14	13	14	13	11	16	16	16	19	18	15	16	15	16	19	18	18	15
in.	14	13	14	13	14	13	14	13	11	16	16	16	19	18	15	16	15	16	19	18	18	15
in.	18	18	18	18	18	18	18	18	20	24	24	19	29	22	15	19	15	19	29	22	22	15
--	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.8	0.8	0.8	0.8	0.8
in.	14	13	14	13	14	13	14	13	11	16	16	16	19	18	15	16	15	16	19	18	18	15
$in.^2$	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
in.	15	14	15	14	15	14	15	14	12	17	17	17	19	20	16	17	16	17	19	20	20	16
kips	3.2	4	3.2	4	3.2	4	3.2	4	2	7.6	7.6	8.4	8.8	9	7	8.4	7	8.4	8.8	9	9	7
--	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.35	0.5	0.5	0.5	0.5	0.5	0.35	0.35	0.5
hp/ton	44	55	44	55	33	43	33	43	14	20	14	28	36	23	40	28	40	21	28	18	17	29
--	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
--	4.56	4.27	4.86	4.27	4.86	4.27	4.86	4.27	4.07	5.83	5.83	5.87	6.17	5.57	4.56	5.87	4.56	5.87	6.17	5.57	5.57	4.56
--	0.9	0.96	0.9	0.96	0.9	0.96	0.9	0.96	0.9	0.9	0.9	0.9	1	0.9	0.96	0.9	0.96	0.9	1	0.9	0.9	0.96
--	4	[illegible]	4	6	4	[illegible]	4	6	[illegible]	8	8	8	8	8	6	8	6	8	8	8	8	6
--																			See Table C2 for Values Used			
--	0.9	0.96	0.9	0.96	0.9	0.96	0.9	0.96	0.9	0.9	0.9	0.9	0.92	0.9	0.96	0.9	0.96	0.9	0.92	0.9	0.9	0.96
--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
--	19	13	19	13	19	13	19	13	22	22	22	29	8	30	14	29	14	29	8	30	30	14
--																			See Table C4 for Values Used			
--	23	29	23	29	23	29	23	23	21	29	29	23	27	19	31	23	31	23	27	19	19	31
--																			See Table C5 for Values Used			
--	[illegible]	8	6	8	9	9	9	9	6	6	7	8	6	7	7	8	7	7	7	7	7	8
--																			See Table C6 for Values Used			
mph	0	0	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0	0	2.5	2.5	0
mph	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
--	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
deg	60	60	60	60	60	60	60	60	60	60	50	60	60	15	60	60	60	60	60	15	15	60
in.	21	13	21	13	21	13	21	13	18	30	30	60	20	37	15	60	15	60	20	37	37	15
psi	15	15	15	15	15	15	15	15	12	15	15	15	15	12	15	15	15	15	15	12	12	15

[illegible]1 (Concluded)

Vehicle Number

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	4[illegible]
18	18	15	[illegible]	15	18	17	18	18	18	17	18	19	21	18	19	19	21	18	19	33	19	19	19
18	18	15	[illegible]	15	18	17	18	18	18	17	18	19	21	18	19	19	21	18	19	33	19	19	19
22	22	15	19	15	20	18	20	20	20	18	[illegible]	24	32	24	34	34	32	24	34	45	32	21	30
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
18	18	15	15	15	18	17	18	18	18	17	[illegible]	19	21	19	19	19	21	18	19	33	19	19	19
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
20	20	[illegible]	17	[illegible]	19	18	19	19	19	18	19	21	22	19	21	21	22	19	21	34	21	21	21
9	9	7	8.4	7	18.8	14.5	18.8	18.8	18.8	14.5	[illegible]	31.5	26.2	17.6	31.8	31.5	26.2	17.6	31.8	43.2	35	13.6	[illegible]
0.35	0.35	0.5	0.5	0.5	0.35	0.5	0.35	0.35	0.35	0.5	0.35	0.35	0.25	0.35	0.35	0.35	0.25	0.35	0.35	0.5	0.35	0.35	[illegible]
18	17	29	21	29	15	18	15	11	12	13	11	[illegible]	17	[illegible]	[illegible]	11	11	15	11	10	9	8	10
1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	1
5.97	5.97	[illegible]	5.97	[illegible]	6.27	6.27	6.27	6.27	6.27	6.27	6.27	6.44	6.40	[illegible]	6.44	6.44	6.40	[illegible]	6.44	[illegible]	6.443	4.10	8.1
0.9	0.9	[illegible]	0.9	0.9	0.9	0.90	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.90	0.9	0.9	0.9	0.90	0.9	0.9	0.9	0.90	0.9
8	8	[illegible]	8	[illegible]	10	8	10	10	10	8	10	5	5	5	5	5	5	5	5	[illegible]	5	10	5
C[illegible] for Values Used																							
0.9	0.9	[illegible]	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.90	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.90	0.9
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
30	30	14	[illegible]	14	[illegible]	10	34	34	34	10	[illegible]	33	24	12	33	33	24	12	33	[illegible]	33	[illegible]	11
C4 for Values Used																							
19	19	31	23	41	29	30	29	29	29	30	29	41	27	30	31	31	27	30	31	29	29	29	41
C5 for Values Used																							
7	7	8	7	[illegible]	7	7	7	8	7	7	[illegible]	9	7	5	9	9	8	5	9	[illegible]	9	7	7
C6 for Values Used																							
2.5	2.5	0	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	2.5	0	0	3	0	0	0
[illegible]	2	2	2	[illegible]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
15	15	60	60	60	60	60	60	60	60	60	60	60	15	60	60	60	15	60	60	15	60	60	60
7	37	15	60	15	72	17	72	72	72	17	[illegible]	78	[illegible]	[illegible]	78	78	[illegible]	[illegible]	78	63	[illegible]	24	[illegible]
2	12	15	15	15	15	15	15	15	15	[illegible]	15	15	30	15	15	15	30	15	15	27	[illegible]	15	15

C

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44	45	46	47	48	49	50	51	52	53	54
[illegible]	[illegible]	[illegible]	21	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	23	19	21	21	12	15	18	14	14	21.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	23	19	21	23	10	9.81	12	14	14	21.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43	45	40	[illegible]	23	23	45	20	18	35
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23	19	21	21	NA	NA	NA	14	14	21.5
[illegible]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3150	[illegible]	[illegible]	NA	NA	NA
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	21	23	23	50	67	67	15	15	23
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35	30.2	15.8	45.7	28.7	55	53	208	3.5	3.2	14
3[illegible]	0.35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.35	0.35	0.35	--	--	NA	NA	NA	0.5	0.5	0.25
[illegible]	[illegible]	11	11	[illegible]	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8	7	[illegible]	17	10	14	40	44	26
[illegible]	1	[illegible]	[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	1	1	1	0	0	0	1	1	1
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.443	9.92	8.31	[illegible]	[illegible]	[illegible]	4.31	5.08	5.38	4.80	5.41
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.95	0.95	0.95	0.9	0.9	0.9
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10		[illegible]	10	[illegible]	5	10	3	2	2	[illegible]	4	6
[illegible]	0.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.9	[illegible]	0.95	0.95	0.9	0.9	0.9
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1215	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*	NA	NA	NA	NA	NA	NA
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16	[illegible]	[illegible]	10	28	[illegible]	17	21	19	20
	31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	31	[illegible]	[illegible]	23	[illegible]	31	23	31
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	7	[illegible]	[illegible]		7	7	7	[illegible]	7	8	[illegible]	7
	0	[illegible]	[illegible]	0	0	[illegible]					0	0	0	0	3	0	0	0	0	0
	2	2	2	2	[illegible]	[illegible]	[illegible]				[illegible]	2	2	2	2	2	2	2	2	2
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.5	0.5	0.5	[illegible]	0.5	0.5	[illegible]	0.5	0.5	0.5
	[illegible]	[illegible]	15	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]		60	[illegible]	60	60	15	60	60	60	60	60
	75	78	[illegible]	[illegible]	75	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	75	60	48	21	21	60
	15	[illegible]	30	15	15	7	[illegible]	[illegible]	1	[illegible]	15	15	[illegible]	[illegible]	NA	NA	NA	15	15	10

(2 of 2 sheets)

Table C2

<u>Transmission Gear Ratios Used for Self-Propelled Vehicles</u>

<u>Vehicle Characteristic Number 49 in Table C1</u>

Vehicle No.	Gear Ratios for Transmission									
1, 3, 5, 7	5.71	3.18	1.67	1.0						
2, 4, 6, 8	6.78	3.76	3.34	2.03	1.85	1.0				
9	13.36	7.8	7.15	4.56	4.17	2.44				
10, 11	12.54	6.4	6.06	3.31	3.09	1.96	1.69	1.0		
12, 16, 18, 23	12.54	6.4	6.06	3.31	3.09	1.96	1.69	1.0		
13, 19	12.84	7.02	6.55	3.58	3.33	1.96	1.70	1.0		
14, 20, 21	12.64	7.06	6.41	3.58	3.06	1.79	1.71	1.0		
15, 17, 22, 24	5.92	3.45	3.02	1.96	1.76	1.00				
25, 27, 28, 29, 31	9.94	5.50	5.02	3.20	2.78	1.98	1.62	1.56	1.0	0.79
26, 30	6.68	3.34	1.66	1.00						
32, 35, 36, 39	12.29	6.88	6.07	3.62	3.40	2.02	1.79	1.58	1.00	0.78
33, 37	5.49	3.95	2.79	2.01	1.44					
34, 38	6.99	4.09	2.24	1.47	1.00					
40	11.2	8.99	5.62	4.49	2.82	2.25	1.71	1.38	1.09	0.875
41, 44	12.29	6.88	6.07	3.62	3.40	2.02	1.79	1.58	1.00	0.78
42	8.05	6.30	4.99	3.95	3.20	2.51	1.97	1.56	1.24	1.00
43	6.60	3.61	1.98	1.17	1.0					
45	18.83	10.80	7.53	6.50	4.32	4.05	2.60	2.50	1.62	1.00
46	6.60	3.60	1.98	1.17	1.00					
47	9.00	5.04	4.09	3.65	2.60	2.29	1.87	1.66	1.88	0.852
48	5.30	2.91	2.77	2.06	1.52	1.51	1.18	1.13	.827	0.647
49	3.79	1.93	1.00							
50	17.12	13.31								
51	3.497	1.256								
52	6.80	3.77	2.80	2.43	1.55	1.0				
53	5.71	3.18	1.67	1.0						
54	6.49	3.84	2.84	2.65	1.68	1.16				

Table C3

Torque Converter Characteristics for

Vehicle Characteristics No. 55 and 57 in Table C1

For Characteristic No. 55, Vehicle 48

Torque Converter Speed Ratio	Engine Speed rpm
0.0	1900
0.10	1880
0.20	1860
0.40	1840
0.46	1860
0.52	1880
0.58	1900
0.70	1950
0.75	1980
0.80	2020
0.85	2080
0.90	2110
0.92	2140

For Characteristic No. 57, Vehicle 48

Torque Converter Speed Ratio	Torque Converter Torque Ratio
0.0	2.610
0.10	2.340
0.20	2.150
0.40	1.750
0.46	1.626
0.52	1.519
0.58	1.390
0.70	1.226
0.75	1.147
0.80	1.068
0.85	0.981
0.90	0.956
0.92	0.933

A

[illegible]

[illegible]

8

Table [illegible]

Obstacle Height - Speed Relations for Vehicle Characteristic No. [illegible]

Vehicle Number																
1, 3, 5, 7		2, 4, 6, 8		9		10, 11		12, [illegible]		15, 19		14, [illegible]		[illegible], 17, [illegible]		[illegible], 27, [illegible]
Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude
1	184	1	83	1	[illegible]		92	1	[illegible]	[illegible]	[illegible]	1	[illegible]	1	164	1
2	46.1	2	73	2	[illegible]	3	40.[illegible]	[illegible]	100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	144	4
3	20.5	3	41.[illegible]	3	28.1	4	23	3	42.4	3	[illegible]	[illegible]	[illegible].8		[illegible]	[illegible]
4	11.[illegible]	4	22.[illegible]	4	[illegible]	[illegible]	14.7	4	27.[illegible]	4	[illegible]	4	[illegible].7	4	[illegible]	[illegible]
5	7.4	[illegible]	14.8	[illegible]	10.[illegible]	[illegible]	10.2	[illegible]	17.4	[illegible]	[illegible]	[illegible]	[illegible].7	[illegible]	[illegible]	7
6	[illegible].1	[illegible]	10.[illegible]	[illegible]	7.0	7	7.5	[illegible]	[illegible].1	[illegible]	[illegible]	[illegible]	7.4	[illegible]	[illegible]	8
7	4.8	7	[illegible]	7	[illegible]	8	[illegible]	7	8.[illegible]	7	[illegible]	7	[illegible]	7	11.7	9
8	2.9	8	[illegible]	8	[illegible]	[illegible]	4.[illegible]	8	[illegible].8	8	[illegible]	[illegible]	[illegible]	8	[illegible].0	10
9	[illegible]	[illegible]	4.[illegible]	[illegible]	[illegible].1	10	[illegible].7	9	[illegible].4	9	10.[illegible]	[illegible]	[illegible]	[illegible]	7.1	11
10	1.8	10	[illegible].7	10	[illegible]	11	[illegible].0	10	4.4	10	[illegible]	[illegible]	[illegible].7	[illegible]	[illegible].7	12
11	1.[illegible]	11	[illegible]	11	[illegible].1	12	[illegible]	11	[illegible]	11	[illegible]	11	[illegible]	11	4.7	13
12	1.[illegible]	12	[illegible]	12	1.8	13	[illegible]	12	[illegible]	[illegible]	[illegible].7	12	[illegible]	[illegible]	4.0	14
13	1.1	13	[illegible]	13	1.[illegible]	14	1.[illegible]	13	2.[illegible]	13	4.9	13	1.[illegible]	[illegible]	[illegible].4	15
14	[illegible]	14	1.[illegible]	14	1.[illegible]	15	1.[illegible]	14	[illegible]	14	4.[illegible]	14	1.4	14	[illegible]	16
15	[illegible]	15	1.[illegible]	15	1.1	16	1.4	15	1.[illegible]	15	[illegible].7	[illegible]	1.[illegible]	[illegible]	[illegible]	17
16	.7	16	1.4	16	1.0	17	1.[illegible]	16	1.7	16	[illegible]	16	1.[illegible]	[illegible]	[illegible]	18
17	[illegible]	17	1.[illegible]	17	.9	18	1.1	17	1.5	17	[illegible]	21	[illegible]	17	[illegible]	19
18	[illegible]	18	1.[illegible]	18	.9	19	1.0	18	1.[illegible]	18	[illegible]	28	[illegible]	18	1.8	20
19	[illegible]	19	1.0	19	.7	20	[illegible]	19	1.[illegible]	19	[illegible]	40	[illegible]	[illegible]	1.[illegible]	21
20	[illegible]	20	[illegible]	7	.3	21	[illegible]	20	1.1	20	[illegible].1			[illegible]	1.4	22
21	.4	21	[illegible]	40	[illegible]	22	[illegible]	21	1.0	[illegible]	1.[illegible]			[illegible]	1.[illegible]	[illegible]
[illegible]	.3	22	[illegible]			[illegible]	.7	30	[illegible]	[illegible]	1.7			[illegible]	1.[illegible]	24
27	.3	[illegible]	.7			24	[illegible]	40	[illegible]	[illegible]	1.[illegible]			[illegible]	1.1	[illegible]
[illegible]	[illegible]	24	[illegible]			[illegible]	[illegible]			[illegible]	1.4			24	1.0	[illegible]
40	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]			[illegible]	1.[illegible]			[illegible]	0.[illegible]	27
		[illegible]	[illegible]			27	[illegible]			[illegible]	[illegible]			[illegible]	0.8	[illegible]
		[illegible]	[illegible]			[illegible]	[illegible]			50	[illegible]			27	0.[illegible]	[illegible]
		[illegible]	.4			[illegible]	.4							[illegible]	0.7	30
		40	.4			30	.4							[illegible]	0.7	40
														[illegible]	0.[illegible]	
														40	[illegible]	

Vehicle Number																
41, 44		42		43		4[illegible]		4[illegible]		47		48		49		[illegible]
Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude
1	7[illegible]	1	101	1	8[illegible]	1	[illegible]	1	74	1	9[illegible]	1	114	1	[illegible]	1
4	74.3	4	101	2	8[illegible]	[illegible]	[illegible]	[illegible]	74	[illegible]	[illegible]	[illegible]	114	[illegible]	[illegible]	[illegible]
[illegible]	57.[illegible]	[illegible]	[illegible]4.8	3	8[illegible]	[illegible]	[illegible].1	[illegible]	51.1	[illegible]	[illegible]	[illegible]	7[illegible].1	[illegible]	71.[illegible]	[illegible]
[illegible]	[illegible].0	[illegible]	45.0	4	8[illegible]	4	[illegible]4.1	7	37.[illegible]	5	[illegible].7	[illegible]	[illegible].1	1[illegible]	[illegible]	4
7	[illegible]4.3	7	[illegible].1	[illegible]	[illegible].7		[illegible]	[illegible]	[illegible].7	[illegible]	1.[illegible]	[illegible]	54.[illegible]	11	[illegible]	[illegible]
	1[illegible]	[illegible]	[illegible]	[illegible]	4[illegible]		[illegible]	[illegible]	[illegible].7	[illegible]	[illegible].1	[illegible]	[illegible]	1[illegible]	[illegible].1	[illegible]
9	1[illegible].7	[illegible]	[illegible]	7	[illegible]	7	[illegible]	10	1[illegible].5	7	1[illegible]	10	[illegible]	[illegible]	[illegible].1	7
10	[illegible]	10	1[illegible]	[illegible]	[illegible].4	[illegible]	[illegible]	11	1[illegible]	[illegible]	1[illegible]	11	[illegible]	[illegible]	[illegible]	[illegible]
1[illegible]	[illegible]	11	1[illegible].4	[illegible]	1[illegible]	[illegible]	[illegible]	1[illegible]	1[illegible]	[illegible]	[illegible]	1[illegible]	1[illegible]	1[illegible]	4.7	[illegible]
12	[illegible]	12	11.[illegible]	1[illegible]	1[illegible].7	1[illegible]	[illegible]	1[illegible]	10.[illegible]	10	[illegible]	1[illegible]	[illegible]	1[illegible]	[illegible]	10
1[illegible]	7.0	1[illegible]	[illegible]	11	1[illegible]	11	1.0	14	[illegible].4	11	[illegible]	1[illegible]	1[illegible]	1[illegible]	[illegible]	11
14	[illegible].1	14	8.[illegible]	[illegible]	1[illegible]	1[illegible]	1.[illegible]	1[illegible]	[illegible]	1[illegible]	[illegible]		1[illegible].7	1[illegible]	[illegible]	1[illegible]
1[illegible]	[illegible]	1[illegible]	7.2	[illegible]	[illegible]	1[illegible]	1.[illegible]	1[illegible]	7.[illegible]	1[illegible]	[illegible].7		11.1	1[illegible]	[illegible]	1[illegible]
1[illegible]	[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	14	1.[illegible]	17	[illegible].4	14	[illegible].1	17	[illegible]	[illegible]	[illegible]	[illegible]
17	4.1	17	[illegible]	1[illegible]	7.[illegible]	15	1.[illegible]	18	[illegible].7	1[illegible]	[illegible]	1[illegible]	[illegible]	[illegible]	1.7	1[illegible]
1[illegible]	3.7	1[illegible]	[illegible].0	1[illegible]	[illegible].1	[illegible]	[illegible]	1[illegible]	[illegible].1	1[illegible]	[illegible].1	1[illegible]	7.[illegible]	[illegible]	1.[illegible]	1[illegible]
1[illegible]	[illegible].3	1[illegible]	4.[illegible]	17	[illegible].4	17	.8	20	4.[illegible]	17	[illegible]	[illegible]	7.1	[illegible]	1.[illegible]	17
20	[illegible].0	20	4.1	18	4.[illegible]	[illegible]	.5	[illegible]	4.[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	24	1.0	1[illegible]
21	2.7	[illegible]	3.7	1[illegible]	4.[illegible]	[illegible]	.4	[illegible]	[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	40	1.0	1[illegible]
[illegible]	[illegible]	[illegible]	3.3	20	3.[illegible]	[illegible]	.3	[illegible]	[illegible]	[illegible]	.0	[illegible]	[illegible].4			[illegible]0
[illegible]	[illegible]	[illegible]	3.1	21	3.[illegible]	4[illegible]	[illegible]	[illegible]4	[illegible]	21	1.8	4	4.[illegible]			[illegible]
24	[illegible]	24	[illegible]	[illegible]	3.[illegible]			[illegible]	[illegible]	[illegible]	1.[illegible]	[illegible]	4.[illegible]			[illegible]
[illegible]	1.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible].7	[illegible]	1.[illegible]	[illegible]	4.[illegible]			40
[illegible]	1.8	[illegible]	[illegible].4	24	[illegible]			27	[illegible]	[illegible]	[illegible].4	27	[illegible]			
27	1.[illegible]	7	[illegible]	[illegible]	[illegible]			28	[illegible]	[illegible]	1.[illegible]	[illegible]	[illegible]			
[illegible]	1.[illegible]	[illegible]	[illegible].1	26	[illegible].4			[illegible]	[illegible]	[illegible]	1.[illegible]	[illegible]	[illegible].4			
[illegible]	[illegible].4	[illegible]	1.9	27	[illegible].1			[illegible]	[illegible]	27	1.1	40	[illegible]			
[illegible]	1.[illegible]	4[illegible]	1.8	28	2.0			40	[illegible]	[illegible]	1.0	40	[illegible]			
40	1.3	40	1.[illegible]	29	1.9					[illegible]	.9					
				30	1.7					[illegible]	.[illegible]					
				40	1.7					50	[illegible]					

Table [illegible]

Obstacle Height – Speed Relations for [illegible]

Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	65
[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.1
[illegible]	[illegible]	[illegible]	[illegible]	9	[illegible]
7	[illegible]	7	7.1	[illegible]	9.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	11	[illegible]
[illegible]	.7	[illegible]	[illegible]	[illegible]	4.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	14	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	19	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	20	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	27	.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Obstacle Magnitude	Vehicle Speed	Obstacle Magnitude	Vehicle Speed
[illegible]	[illegible]	[illegible]	[illegible]

B

Table C6

Ride-Speed Relation for Vehicle Characteristic No. 63 in Table C1

Vehicle No. 1, 3		Vehicle No. 2, 4		Vehicle No. 5, 7		Vehicle No. 6, 8		Vehicle No. 9		Vehicle No. 10	
RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph
0	60.0	0	60.0	0	30.0	0	30.0	0	25.0	0	50.0
0.5	60.0	0.88	60.0	1.0	30.0	1.42	30.0	0.26	25.0	0.5	50.0
1.0	32.0	1.5	25.0	1.5	15.5	1.5	26.0	1.0	5.3	1.0	30.0
1.5	15.5	2.0	18.0	2.0	8.0	2.0	18.0	2.0	4.4	1.5	10.0
2.0	8.0	2.5	7.0	3.0	4.6	2.5	7.0	5.0	4.0	3.0	4.4
3.0	5.0	3.0	6.0	5.0	2.5	3.0	6.0	8.0	3.3	6.0	2.0
6.0	2.5	5.0	3.0	9.0	1.0	5.0	3.0			8.0	1.4
9.0	1.0	9.0	2.0			9.0	1.9				

Vehicle No. 11		Vehicle No. 12, 16		Vehicle No. 13		Vehicle No. 14		Vehicle No. 15, 17		Vehicle No. 18, 23	
RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph
0	30.0	0	60.0	0	60.0	0	55.0	0	60.0	0	30.0
0.95	30.0	0.5	60.0	0.48	60.0	0.5	55.0	0.5	60.0	0.96	30.0
1.5	10.0	1.0	30.0	1.0	25.0	1.0	25.0	1.5	15.0	1.46	13.0
3.0	4.0	1.5	13.0	2.0	7.0	2.0	14.0	2.0	7.0	2.0	6.2
6.0	2.0	2.0	7.6	6.0	1.3	3.0	5.0	3.0	4.0	4.0	3.5
9.0	0.7	3.0	4.0	8.0	1.3	5.0	2.0	5.0	2.5	6.0	2.1
		6.0	2.0			8.0	1.2	9.0	1.0	8.0	1.5
		8.0	1.2								

Vehicle No. 19		Vehicle No. 20		Vehicle No. 21		Vehicle No. 22, 24		Vehicle No. 25, 27		Vehicle No. 26	
RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph
0	30.0	0	30.0	0	55.0	0	30.0	0	50.0	0	60.0
0.92	30.0	0.9	30.0	0.5	55.0	1.12	30.0	0.5	50.0	0.1	60.0
1.0	25.0	1.0	25.0	1.0	25.0	1.5	15.0	1.0	21.5	0.5	24.0
2.0	5.3	2.0	12.0	2.0	11.0	2.0	7.0	1.5	10.0	1.0	15.5
5.0	2.0	3.0	5.0	3.0	5.0	3.0	4.0	2.0	7.5	2.0	2.2
9.0	1.3	5.0	2.0	5.0	2.5	5.0	2.5	3.0	3.0	3.0	2.0
		8.0	1.3	8.0	1.4	9.0	1.0	4.0	2.5	9.0	0.9
								5.0	2.3		
								7.0	1.3		
								9.0	1.0		

(Continued)

(1 of 3 sheets)

Table C6 (continued)

Vehicle No. 28, 31

RMS in.	SPD mph
0	30.0
0.48	30.0
0.50	28.0
1.0	16.0
2.0	3.0
3.0	2.0
9.0	1.0

Vehicle No. 29

RMS in.	SPD mph
0	47.4
0.5	47.4
1.0	20.4
1.5	9.5
2.0	7.1
3.0	2.8
4.0	2.4
5.0	2.0
7.0	1.2
9.0	0.9

Vehicle No. 30

RMS in.	SPD mph
0	30.0
0.45	30.0
0.5	24.0
1.0	15.4
2.0	2.2
3.0	2.0
9.0	1.0

Vehicle No. 32, 35

RMS in.	SPD mph
0	50.0
0.1	50.0
0.5	32.0
1.0	12.5
1.5	11.0
2.0	5.0
3.0	2.5
5.0	1.5
8.0	1.1

Vehicle No. 33

RMS in.	SPD mph
0	50.0
0.5	50.0
1.0	19.6
1.5	17.0
3.0	8.0
6.0	3.0
9.0	2.0

Vehicle No. 34

RMS in.	SPD mph
0	60.0
0.12	60.0
0.5	4.0
1.0	3.0
9.0	2.0

Vehicle No. 36, 39

RMS in.	SPD mph
0	50.0
0.15	50.0
0.50	31.0
1.0	12.7
1.5	11.0
2.0	3.0
3.0	2.0
5.0	1.9
9.0	1.1

Vehicle No. 37

RMS in.	SPD mph
0	50.0
0.50	50.0
1.0	19.6
1.5	17.0
3.0	8.0
6.0	3.0
9.0	2.0

Vehicle No. 38

RMS in.	SPD mph
0	60.0
0.14	60.0
0.5	3.8
1.0	2.6
9.0	1.0

Vehicle No. 40

RMS in.	SPD mph
0	30.0
0.8	30.0
1.1	23.0
1.5	9.0
3.0	4.1
8.0	2.2

Vehicle No. 41, 44

RMS in.	SPD mph
0	60.0
0.2	0.0
0.4	50.0
0.7	31.0
1.0	12.5
2.0	3.6
3.0	1.8
4.0	1.4
8.0	1.0

Vehicle No. 42

RMS in.	SPD mph
0	60.0
0.2	60.0
0.5	12.0
1.0	4.0
2.0	3.0
3.0	2.0
9.0	1.0

Vehicle No. 43

RMS in.	SPD mph
0	60.0
0.20	60.0
0.50	17.0
1.0	3.9
2.0	2.2
5.0	1.2
9.0	1.0

Vehicle No. 45

RMS in.	SPD mph
0	40.0
0.12	40.0
0.28	32.0
1.0	3.9
5.0	1.0
3.0	0.5

Vehicle No. 46

RMS in.	SPD mph
0	20.0
0.38	20.0
0.50	4.0
1.0	2.4
4.0	2.0
9.0	0.8

Vehicle No. 47

RMS in.	SPD mph
0	36.0
0.1	36.0
0.3	17.0
1.0	6.0
2.0	4.0
4.0	2.3
9.0	0.8

Vehicle No. 48

RMS in.	SPD mph
0	38.0
0.1	38.0
0.5	11.8
1.0	6.3
2.0	4.2
3.0	4.0
9.0	0.8

Vehicle No. 49

RMS in.	SPD mph
0	60.0
0.2	60.0
0.47	60.0
0.50	39.0
1.0	16.8
2.0	9.8
3.0	8.1
8.0	3.0

(Continued)

(2 of 3 sheets)

Table C6 (concluded)

Vehicle No. 50		Vehicle No. 51		Vehicle No. 52		Vehicle No. 53		Vehicle No. 54		Vehicle No.	
RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph	RMS in.	SPD mph
0	37.5	0	60.0	0	60.0	0	60.0	0	50.0		
0.5	37.5	0.47	60.0	0.2	60.0	0.20	60.0	1.0	50.0		
1.0	15.0	0.50	39.0	1.0	12.0	1.0	19.5	1.5	23.0		
2.0	6.3	1.0	16.8	2.0	6.0	1.5	11.0	3.0	14.0		
3.0	3.5	2.0	9.4	3.0	5.0	3.0	6.0	6.0	12.0		
9.0	2.0	3.0	8.1	4.0	3.0	9.0	1.0	7.0	3.0		
		8.0	3.0	5.0	3.0			9.0	2.0		
				8.0	2.8						

Table C7

Speed Limits Used in Study, mph

Vehicle No.	Vehicle Name	Speed Limit mph	Recommended Towed Speed From TACOM Data Sheets Off-Road	On-Road	Dynamic Speed Limits Used in Vehicle Data File Off-Road	On-Road
			Category 1: 1/4-ton Payload			
1	M151A2 (4x4)	65	--	--	60	60
2	4x4 Commercial	--	--	--	60	60
3	M151A2 (4x2)	65	--	--	60	60
4	4x2 Commercial	--	--	--	60	60
5	M151A2 (4x4)/M416T	65	30	50	30	50
6	4x4 Com./M416	--	30	50	30	50
7	M151A2 (4x2)/M416	65	30	50	30	50
8	4x2 Com./M416	--	30	50	30	50
			Category 2: 1/2-ton Payload			
9	M274A2 (4x4)	25	--	--	--	--
			Category 3: 3/4-ton Payload			
10	M37B1 (4x4)	55	--	--	55	55
11	M37B1 (4x4)/M101A1T	55	30	55	30	55
			Category 4: 1-1/4-ton Payload			
12	M715E1 (4x4)	64	--	--	60	60
13	XM705 (4x4)	66	--	--	60	60
14	M561 (6x6)	55	--	--	55	55
15	4x4 Commercial	--	--	--	60	60
16	M715E1 (4x2)	50	--	--	60	60
17	4x2 Commercial	--	--	--	60	60
18	M715E1 (4x4)/M101A1	64	30	55	30	55
19	XM705 (4x4)/M101A1	66	30	55	30	55
20	M561 (6x6)/M101A1	55	30	55	30	55
21	M561 (6x6)/M102H	55	10	--	55	55
22	4x4 Com./M101A1	--	30	55	30	55
23	M715E1 (4x2)/M101A1	64	30	55	30	55
24	4x2 Com./M101A1	--	30	55	30	55

(Continued)

(1 of 3 sheets)

Table C7 (Continued)

Vehicle No.	Vehicle Name	Speed Limit mph	Recommended Towed Speed From TACOM Data Sheets Off-Road	On-Road	Dynamic Speed Limits Used in Vehicle Data File Off-Road	On-Road
			Category 5: 2-1/2-ton Payload			
25	M35A2 (6x6)	50	--	--	50	50
26	4x4 Commercial	--	--	--	60	60
27	M35A2 (6x4)	50	--	--	50	50
28	M35A2 (6x6)/M105A2	50	20	50	20	50
29	M35A2 (6x6)/M102H	50	10	--	50	50
30	4x2 Com./M105A2	--	20	50	20	50
31	M35A2 (6x4)/M105A2	50	30	50	30	50
			Category 6: 5-ton Payload			
32	M813 (6x6)	52	--	--	52	52
33	M656 (8x8)	50	--	--	50	50
34	6x4 Commercial	--	--	--	60	60
35	M813 (6x4)	52	--	--	52	52
36	M813 (6x6)/M114A1	52	--	--	52	52
37	M656 (8x8)/M114A1	50	--	--	50	50
38	6x4 Com./12,700#	--	--	--	60	60
39	M813 (6x4)/12,700#	52	--	--	52	52
			Category 7: 8-ton Payload			
40	M520E1 (4x4)	30	--	--	30	30
			Category 8: 5-ton Tractor with 12-ton, 4-Wheel Trailer			
41	M818 (6x6)/M127A1C	52	20	50	20	50
42	6x4 Com./M127A1C	--	20	50	20	50
43	6x4 Com./M127A1C	--	20	50	20	50
44	M818 (6x4)/M127A1C	52	20	50	20	50
			Category 9: 10-ton Tractor with 25-ton, 4-Wheel Trailer			
45	M123A1C (6x6)/M172A1	44	20	30	20	30
46	6x4 Com./M172A1	--	20	30	20	30
			Category 10: 22-1/2-ton Tractor with 52-1/2-ton Trailer			
47	XM746 (8x8)/M747	36	--	36	36	36
48	8x4 Com./M747	--	--	36	36	36

(Continued)

(2 of 3 sheets)

Table C7 (Concluded)

Vehicle No.	Vehicle Name	Speed Limit mph	Recommended Towed Speed From TACOM Data Sheets		Dynamic Speed Limits Used in Vehicle Data File	
			Off-Road	On-Road	Off-Road	On-Road
			Category 11: Reference Vehicles			
49	M113 (Tracked)	40	--	--	60	60
50	M548 (Tracked)	39	--	--	37.5	37.5
51	M60A1 (Tracked)	30	--	--	60	60
52	M38A1 (4x4)	71	--	--	60	60
53	M151A1 (4x4)	65	--	--	60	60
54	XM410 (8x8)	55	--	--	50	50

(3 of 3 sheets)

Table [illegible]

Vehicle Characteristics Used in Dynamic Simulation

No.	Identification	Dimensions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Number of axles	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Sprung mass	slugs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Sprung mass divided by two	slugs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Moment of inertia	slug-ft²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Moment of inertia divided by two	slug-ft²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	Location of front axle relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	Location of second axle relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	Location of third axle relative to c.g.	ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9	Location of fourth axle relative to c.g.	ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	Location of driver relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	Spring constant for front axle	lb/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	Spring constant for second axle	lb/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	Spring constant for third axle	lb/ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	Spring constant for fourth axle	lb/ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
15	Damping constant for front axle	lb-sec/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	Damping constant for second axle	lb-sec/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	Damping constant for third axle	lb-sec/ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	Damping constant for fourth axle	lb-sec/ft	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
19	Total load on front axle	lb	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	Ratio of sprung to unsprung [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	Total effective spring rate, front axle	lb/in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	Wheelbase	in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

No.	Identification	Dimensions	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	Number of axles	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	Sprung mass	slugs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Sprung mass divided by two	slugs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	Moment of inertia	slug-ft²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Moment of inertia divided by two	slug-ft²	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	Location of front axle relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	Location of second axle relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	Location of third axle relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]
9	Location of fourth axle relative to c.g.	ft	[illegible]	[illegible]	--	[illegible]	[illegible]	--	--	[illegible]	--	[illegible]	--	[illegible]	--	--	--
10	Location of driver relative to c.g.	ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	Spring constant for front axle	lb/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	Spring constant for second axle	lb/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	Spring constant for third axle	lb/ft	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]
14	Spring constant for fourth axle	lb/ft	--	--	--	[illegible]	[illegible]	--	--	[illegible]	--	--	--	--	--	--	--
15	Damping constant for front axle	lb-sec/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	Damping constant for second axle	lb-sec/ft	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	Damping constant for third axle	lb-sec/ft	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]
18	Damping constant for fourth axle	lb-sec/ft	--	--	--	[illegible]	[illegible]	--	--	[illegible]	--	--	--	--	--	--	--
19	Total load on front axle	lb	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	Ratio of sprung to unsprung [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	Total effective spring rate, front axle	lb/in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	Wheelbase	in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B

APPENDIX D: SAMPLE OUTPUT LISTINGS

This appendix includes a complete sample of output listings for the performance of the M35A2 2-1/2-ton, 6x6 cargo truck, as follows:

Table D1 - In areal terrain for West Germany traverse, wet season

Table D2 - In areal terrain for Thailand traverse, wet season

Table D3 - In areal terrain for Arizona traverse, wet season

Table D4 - In linear terrain for West Germany traverse, wet season

Table D5 - On road for West Germany traverse, wet season

Table D6 - On road for Thailand traverse, wet season

Table D7 - On road for Arizona traverse, wet season

Table D1

West Germany Wet-Season Off-Road Speed Predictions for M35A2 2-1/2-Ton, 6x6 Cargo Truck

Terrain Units		% Distance		Predicted Speed		Factor Limiting Speed		
		In Unit	Accum	In Unit	Accum	Up	Level	Down
1	231	0.0	0.0	32.2	32.2	6	6	7
2	304	0.1	0.1	32.2	32.2	6	6	7
3	20	0.1	0.2	32.2	32.2	6	6	7
4	299	0.1	0.3	32.2	32.2	-	6	7
5	14	0.1	0.3	32.2	32.2	6	6	7
6	318	0.0	0.4	32.2	32.2	6	6	7
7	274	0.0	0.4	32.2	32.2	6	6	7
8	27	0.0	0.4	32.2	32.2	6	6	7
9	320	0.0	0.4	32.2	32.2	6	6	7
10	321	0.0	0.4	32.2	32.2	6	6	7
11	282	0.1	0.5	29.2	32.1	9	6	7
12	942	0.2	0.7	27.7	29.3	6	9	7
13	325	2.0	2.7	26.8	25.1	10	10	10
14	447	1.0	3.7	24.4	25.2	6	6	7
15	32	0.3	4.0	24.4	25.1	6	6	7
16	55	0.2	4.3	24.4	25.1	6	6	7
17	443	0.1	4.3	24.4	25.1	6	6	7
18	365	0.1	4.4	24.4	25.1	6	6	7
19	410	0.1	4.5	24.4	25.1	6	6	7
20	378	0.0	4.5	24.4	25.1	6	6	7
21	496	0.0	4.5	24.4	25.1	6	6	7
22	413	0.0	4.6	24.4	25.1	6	6	7
23	348	0.0	4.6	24.4	25.0	6	6	7
24	398	0.0	4.6	24.4	25.0	6	6	7
25	333	0.0	4.6	24.4	25.0	6	6	7
26	392	0.0	4.6	24.4	25.0	6	6	7
27	437	0.0	4.6	24.4	25.0	6	6	7
28	395	0.0	4.7	24.4	25.0	6	6	7
29	457	0.0	4.7	24.4	25.0	6	6	7
30	41	0.0	4.7	24.4	25.0	6	6	7
31	455	0.1	4.8	24.0	25.0	6	9	7
32	1047	0.6	5.4	20.1	24.3	6	6	6
33	1042	0.1	5.5	20.1	24.2	6	6	6
34	1021	0.1	5.6	20.1	24.1	6	6	6
35	1039	0.1	5.7	20.1	24.1	6	6	6
36	998	0.0	5.7	20.1	24.1	6	6	6
37	1017	0.0	5.7	20.1	24.0	6	6	6
38	1078	0.0	5.7	20.1	24.0	6	6	6
39	297	0.6	6.3	20.0	23.6	5	5	5
40	208	0.2	6.5	20.0	23.5	5	5	5
41	198	0.1	6.6	20.0	23.4	5	5	5
42	248	0.1	6.7	20.0	23.4	5	5	5
43	200	0.1	6.8	20.0	23.3	5	5	5
44	943	0.0	6.8	20.0	23.3	5	5	5
45	280	0.0	6.8	20.0	23.3	5	5	5
46	273	0.0	6.9	20.0	23.3	5	5	5
47	237	0.0	6.9	20.0	23.2	5	5	5
48	940	0.0	6.9	20.0	23.2	5	5	5
49	319	0.0	6.9	20.0	23.2	5	5	5
50	207	0.0	6.9	20.0	23.2	5	5	5
51	235	0.0	6.9	20.0	23.2	5	5	5
52	294	0.0	7.0	20.0	23.2	5	5	5
53	974	0.0	7.0	19.3	23.2	6	5	5
54	1142	5.9	12.9	19.0	21.1	6	6	7
55	91	0.3	13.2	19.0	21.0	6	6	7
56	315	0.2	13.4	19.0	21.0	6	6	7
57	1027	0.1	13.5	19.0	21.0	6	6	7
58	546	0.1	13.7	19.0	20.9	6	6	7
59	510	0.1	13.8	19.0	20.9	6	6	7
60	530	0.1	13.9	19.0	20.9	6	6	7
61	71	0.1	14.0	19.0	20.9	6	6	7
62	1094	0.1	14.0	19.0	20.9	6	6	7
63	1134	0.1	14.1	19.0	20.9	6	6	7
64	1096	0.1	14.1	19.0	20.9	6	6	7
65	1154	0.0	14.2	19.0	20.9	6	6	7
66	698	0.0	14.2	19.0	20.8	6	6	7
67	1099	0.0	14.3	19.0	20.8	6	6	7
68	533	0.0	14.3	19.0	20.8	6	6	7
69	1137	0.0	14.3	19.0	20.8	6	6	7
70	1170	0.0	14.3	19.0	20.8	6	6	7
71	759	0.0	14.3	19.0	20.8	6	6	7
72	1175	0.0	14.3	19.0	20.8	6	6	7
73	1094	0.0	14.4	18.9	20.8	6	6	10
74	1162	0.0	14.4	18.8	20.8	6	6	10
75	457	0.7	15.1	18.3	20.7	6	5	5
76	336	0.3	15.4	18.3	20.6	6	5	5
77	440	0.2	15.6	18.3	20.6	6	5	5
78	397	0.2	15.7	18.3	20.6	6	5	5
79	38	0.1	15.8	18.3	20.6	6	5	5
80	419	0.1	15.9	18.3	20.6	6	5	5
81	343	0.1	16.0	18.3	20.5	6	5	5
82	405	0.1	16.0	18.3	20.5	6	5	5
83	454	0.1	16.1	18.3	20.5	6	5	5
84	332	0.1	16.2	18.3	20.5	6	5	5
85	375	0.0	16.2	18.3	20.5	6	5	5
86	416	0.0	16.2	18.3	20.5	6	5	5
87	351	0.0	16.3	18.3	20.5	6	5	5
88	407	0.0	16.3	18.3	20.5	6	5	5
89	431	0.0	16.4	18.3	20.5	6	5	5
90	470	0.0	16.4	18.3	20.5	6	5	5
91	386	0.0	16.4	18.3	20.5	6	5	5
92	344	0.0	16.4	18.3	20.5	6	5	5
93	458	0.0	16.4	18.3	20.5	6	5	5
94	1049	0.1	16.5	18.2	20.5	6	5	5
95	1028	0.1	16.6	18.2	20.5	6	5	5
96	1058	0.0	16.6	18.2	20.4	6	5	5
97	1053	0.0	16.6	18.2	20.4	6	5	5
98	1058	0.0	16.6	18.2	20.4	6	5	5
99	598	0.0	16.6	17.7	20.4	6	6	7
100	1145	0.1	16.7	17.3	20.4	10	10	10

(continued)

(1 of 6 sheets)

Table 11 (Continued)

TERRAIN	UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
101	524	0.0	16.7	16.8	20.4	9	6	7
102	547	0.0	16.8	16.8	20.4	9	6	7
103	598	0.3	16.8	16.8	20.4	9	6	7
104	967	0.0	16.8	16.8	20.4	9	6	7
105	971	0.1	16.9	16.7	20.4	6	9	7
106	966	0.1	17.0	16.7	20.4	6	9	7
107	1179	0.1	17.1	15.2	20.3	5	5	5
108	1032	0.1	17.2	16.2	20.3	5	5	5
109	1128	0.0	17.2	15.2	20.3	5	5	5
110	1099	0.0	17.3	16.2	20.3	6	5	5
111	1109	0.0	17.3	16.2	20.3	6	5	5
112	1143	0.0	17.3	16.2	20.3	5	5	5
113	1139	0.0	17.3	16.2	20.3	6	5	5
114	1130	0.0	17.3	16.2	20.3	6	5	5
115	1173	0.0	17.3	16.2	20.3	6	5	5
116	1652	0.1	17.4	15.9	20.2	9	9	5
117	1239	2.6	20.0	15.3	19.4	6	6	7
118	1193	0.3	20.3	15.3	19.3	6	6	7
119	1256	0.1	20.4	15.3	19.3	6	6	7
120	1202	0.1	20.5	15.3	19.3	6	6	7
121	1201	0.1	20.5	15.3	19.3	6	6	7
122	1196	0.1	20.6	15.3	19.3	6	6	7
123	1223	0.1	20.7	15.3	19.2	6	6	7
124	1360	0.0	20.8	15.3	19.2	6	6	7
125	1361	0.0	20.8	15.3	19.2	6	6	7
126	1214	0.0	20.8	15.3	19.2	6	5	7
127	113	0.3	21.0	15.2	19.2	6	5	5
128	626	0.2	21.2	15.2	19.1	6	5	5
129	543	0.1	21.3	15.2	19.1	6	5	5
130	527	0.1	21.4	15.2	19.1	6	5	5
131	613	0.1	21.4	15.2	19.1	6	5	5
132	665	0.1	21.5	15.2	19.1	6	5	5
133	574	0.0	21.5	15.2	19.0	6	5	5
134	564	0.0	21.6	15.2	19.0	6	5	5
135	93	0.0	21.6	15.2	19.0	6	5	5
136	697	0.0	21.7	15.2	19.0	6	5	5
137	558	0.0	21.7	15.2	19.0	6	5	5
138	652	0.0	21.8	15.2	19.0	6	5	5
139	553	0.0	21.8	15.2	19.0	6	5	5
140	24	1.7	23.5	14.9	18.6	9	9	8
141	19	0.1	23.6	14.9	18.6	9	9	8
142	295	0.0	23.6	14.9	18.6	9	9	8
143	941	0.0	23.6	14.9	18.6	9	9	8
144	4	0.0	23.7	14.9	18.6	9	9	8
145	937	0.0	23.7	14.8	18.6	9	10	10
146	568	0.2	23.8	13.8	18.5	9	5	5
147	611	0.1	24.0	13.8	18.5	9	5	5
148	679	0.0	24.0	13.8	18.5	9	5	5
149	982	0.0	24.0	13.8	18.5	9	5	5
150	559	0.0	24.0	13.8	18.5	9	5	5
151	969	0.1	24.1	13.7	18.5	6	5	5
152	938	0.0	24.1	13.7	18.5	5	5	5
153	1197	0.2	24.4	13.5	18.4	5	5	5
154	1254	0.1	24.5	13.5	18.4	6	5	5
155	1255	0.1	24.5	13.5	18.3	6	5	5
156	1256	0.1	24.6	13.5	18.3	6	5	5
157	1190	0.1	24.7	13.5	18.3	6	5	5
158	1213	0.0	24.7	13.5	18.3	6	5	5
159	1204	0.0	24.7	13.5	18.3	6	5	5
160	1211	0.0	24.8	13.5	18.3	6	5	5
161	1217	0.0	24.8	13.5	18.3	6	5	5
162	[illegible]	0.0	24.8	13.2	18.3	9	10	10
163	1337	0.5	[illegible]	[illegible]	18.3	6	6	6
164	1276	0.1	24.7	12.3	18.2	9	9	5
165	42?	2.2	27.1	12.1	17.5	9	9	8
165	1384	0.3	27.4	12.1	17.4	6	6	5
167	488	0.2	27.7	12.1	17.4	9	10	10
168	32	0.1	27.8	12.1	17.3	9	9	7
169	1332	0.1	27.9	12.1	17.3	6	6	5
170	393	0.0	27.9	12.1	17.3	9	8	8
171	1364	0.0	27.9	12.1	17.3	6	6	5
172	634	2.7	30.6	11.5	16.6	9	9	8
173	66	0.1	30.7	11.5	16.5	9	9	8
174	677	0.0	30.7	11.5	16.5	9	9	8
175	[illegible]	0.0	30.7	11.5	16.5	9	9	8
176	1375	1.2	31.9	11.4	16.3	5	6	9
177	1377	0.3	32.2	11.4	16.2	6	6	9
178	1376	0.1	32.3	11.4	16.2	6	6	9
179	1370	0.0	32.3	11.4	16.2	5	6	9
180	1380	0.0	32.3	11.4	16.2	6	6	9
181	1382	0.1	32.4	11.2	16.2	6	6	7
182	1093	0.0	32.4	11.0	16.1	9	9	8
183	632	0.1	32.5	10.3	16.1	9	9	7
184	1395	0.0	32.5	10.3	16.1	6	6	5
185	151	0.5	33.0	9.9	16.0	9	6	7
186	746	0.2	33.2	9.9	15.9	9	6	7
187	128	0.1	33.3	9.9	15.9	6	6	7
188	863	0.1	33.5	9.9	15.8	9	6	7
189	896	0.0	33.5	9.9	15.8	9	6	7
190	772	0.1	33.6	9.9	15.8	9	6	7
191	453	0.0	33.5	9.9	15.8	9	6	7
192	749	0.0	33.5	9.9	15.8	9	6	7
193	113	0.0	33.7	9.9	15.8	9	6	7
194	863	0.0	33.7	9.9	15.8	9	6	7
195	512	0.0	33.7	9.9	15.8	9	6	7
196	357	0.0	33.7	9.9	15.8	9	6	7
197	451	0.0	33.7	9.2	15.8	9	7	7
198	1233	0.5	34.2	9.3	15.6	6	6	7
199	1297	0.1	34.3	9.3	15.6	6	6	7
200	1333	0.1	34.4	9.3	15.6	6	6	7

(Continued)

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	TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
201	1298	0.0	34.4	9.3	15.5	6	6	7
202	1293	0.0	34.5	9.3	15.5	6	6	7
203	1320	0.0	34.5	9.3	15.5	6	6	7
204	912	0.2	34.7	9.0	15.4	6	6	7
205	883	0.1	34.9	9.0	15.4	6	6	7
206	918	0.1	35.0	9.0	15.4	6	6	7
207	891	0.0	35.0	9.0	15.4	6	6	7
208	354	0.0	35.1	9.0	15.3	6	6	7
209	104	0.0	35.1	9.0	15.3	9	8	8
210	174	0.0	35.1	9.0	15.3	6	6	7
211	172	0.0	35.1	9.0	15.3	6	6	7
212	768	0.3	35.4	8.8	15.2	6	6	7
213	127	0.2	35.5	8.8	15.2	9	5	5
214	830	0.1	35.7	8.8	15.2	9	5	5
215	821	0.1	35.8	8.8	15.1	9	5	5
216	126	0.1	35.9	8.8	15.1	9	5	5
217	162	0.1	36.0	8.8	15.1	9	5	5
218	1295	0.1	36.0	8.8	15.0	9	5	5
219	1294	0.1	36.1	8.8	15.0	6	5	5
220	1292	0.1	36.1	8.8	15.0	6	5	5
221	775	0.1	36.2	8.8	15.0	9	5	5
222	860	0.1	36.2	8.8	15.0	9	5	5
223	117	0.0	36.3	8.8	15.0	8	5	5
224	740	0.0	36.3	8.8	15.0	9	5	5
225	748	0.0	36.4	8.8	14.9	9	5	5
226	838	0.0	36.4	8.8	14.9	9	5	5
227	1338	0.0	36.4	8.8	14.9	4	5	5
228	980	0.0	36.4	8.8	14.9	6	5	5
229	776	0.0	36.5	8.8	14.9	9	5	5
230	1337	0.0	36.5	8.6	14.9	6	10	13
231	179	0.2	36.7	8.4	14.9	6	5	5
232	920	0.0	36.7	8.4	14.8	6	5	5
233	902	0.0	36.8	8.4	14.8	6	5	5
234	896	0.0	36.8	8.4	14.8	6	5	5
235	132	0.0	36.8	8.4	14.8	9	7	7
236	33	0.0	36.8	8.4	14.8	7	7	7
237	173	0.0	36.8	8.4	14.8	6	5	5
238	100	0.1	36.9	8.3	14.8	9	7	7
239	767	0.0	37.0	8.3	14.8	9	9	8
240	555	0.0	37.0	8.3	14.7	9	7	7
241	83	0.0	37.0	8.3	14.7	9	7	7
242	1354	0.0	37.0	8.2	14.7	6	5	5
243	1432	0.1	37.1	7.9	14.7	6	6	5
244	1406	0.1	37.2	7.9	14.7	6	6	5
245	146	0.0	37.2	7.9	14.7	9	9	7
246	118	0.0	37.2	7.9	14.7	9	9	8
247	735	0.0	37.2	7.9	14.7	9	9	8
248	1399	0.0	37.3	7.9	14.7	6	6	5
249	834	0.0	37.3	7.9	14.7	9	9	8
250	1056	6.5	43.8	7.7	12.9	5	5	5

	TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
251	473	3.9	47.7	7.7	12.2	5	5	5
252	292	1.9	49.6	7.7	12.0	5	5	5
253	1265	1.7	51.2	7.7	11.8	5	5	5
254	313	1.4	52.6	7.7	11.6	5	5	5
255	104	0.7	53.4	7.7	11.5	5	5	5
256	1071	0.7	54.1	7.7	11.4	5	5	5
257	490	0.6	54.7	7.7	11.4	5	5	5
258	55	0.6	55.3	7.7	11.3	5	5	5
259	988	0.5	55.8	7.7	11.3	5	5	5
260	12	0.4	56.2	7.7	11.2	5	5	5
261	1172	0.4	56.5	7.7	11.2	5	5	5
262	262	0.3	56.8	7.7	11.2	5	5	5
263	990	0.3	57.1	7.7	11.2	5	5	5
264	63	0.3	57.4	7.7	11.1	5	5	5
265	66	0.2	57.6	7.7	11.1	5	5	5
266	565	0.2	57.8	7.7	11.1	5	5	5
267	784	0.2	58.1	7.7	11.1	5	5	5
268	584	0.2	58.3	7.7	11.1	5	5	5
269	37	0.2	58.5	7.7	11.0	5	5	5
270	72	0.2	58.6	7.7	11.0	5	5	5
271	380	0.2	58.8	7.7	11.0	5	5	5
272	1225	0.1	58.9	7.7	11.0	5	5	5
273	1169	0.1	59.0	7.7	11.0	5	5	5
274	26	0.1	59.2	7.7	11.0	5	5	5
275	358	0.1	59.3	7.7	11.0	5	5	5
276	1089	0.1	59.4	7.7	11.0	5	5	5
277	1372	0.1	59.5	7.7	11.0	5	5	5
278	1364	0.1	59.7	7.7	10.9	5	5	5
279	1253	0.1	59.8	7.7	10.9	5	5	5
280	1389	0.1	59.9	7.7	10.9	5	5	5
281	961	0.1	60.0	7.7	10.9	5	5	5
282	692	0.1	60.1	7.7	10.9	5	5	5
283	381	0.1	60.2	7.7	10.9	5	5	5
284	169	0.1	60.3	7.7	10.9	5	5	5
285	1368	0.1	60.4	7.7	10.9	5	5	5
286	674	0.1	60.4	7.7	10.9	5	5	5
287	541	0.1	60.5	7.7	10.9	5	5	5
288	314	0.1	60.6	7.7	10.9	5	5	5
289	393	0.1	60.7	7.7	10.9	5	5	5
290	999	0.1	60.8	7.7	10.9	5	5	5
291	1123	0.1	60.9	7.7	10.9	5	5	5
292	939	0.1	60.9	7.7	10.8	5	5	5
293	1088	0.1	61.0	7.7	10.8	5	5	5
294	5	0.1	61.1	7.7	10.8	5	5	5
295	214	0.1	61.1	7.7	10.8	5	5	5
296	246	0.1	61.2	7.7	10.8	5	5	5
297	227	0.1	61.3	7.7	10.8	5	5	5
298	1136	0.1	61.3	7.7	10.8	5	5	5
299	224	0.1	61.4	7.7	10.8	5	5	5
300	75	0.0	61.4	7.7	10.8	5	5	5

(Continued)

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Table No. D1 (Continued)

	TERRAIN UNIT #	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
301	1085	0.0	61.5	7.7	10.8	5	5	5
302	1086	0.0	61.5	7.7	10.8	5	5	5
303	1256	0.0	61.6	7.7	10.8	5	5	5
304	699	0.0	61.6	7.7	10.8	5	5	5
305	259	0.0	61.6	7.7	10.8	5	5	5
306	1241	0.0	61.7	7.7	10.8	5	5	5
307	1199	0.0	61.7	7.7	10.8	5	5	5
308	1236	0.0	61.8	7.7	10.8	5	5	5
309	1104	0.0	61.8	7.7	10.8	5	5	5
310	1138	0.0	61.8	7.7	10.8	5	5	5
311	503	0.0	61.9	7.7	10.8	5	5	5
312	296	0.0	61.9	7.7	10.8	5	5	5
313	839	0.0	61.9	7.7	10.8	5	5	5
314	559	0.0	61.9	7.7	10.8	5	5	5
315	1235	0.0	62.0	7.7	10.8	5	5	5
316	242	0.0	62.0	7.7	10.8	5	5	5
317	391	0.0	62.0	7.7	10.8	5	5	5
318	1186	0.0	62.1	7.7	10.8	5	5	5
319	1239	0.0	62.1	7.7	10.8	5	5	5
320	1051	0.0	62.1	7.7	10.8	5	5	5
321	1282	0.0	62.1	7.7	10.8	5	5	5
322	286	0.0	62.2	7.7	10.8	5	5	5
323	973	0.0	62.2	7.7	10.8	5	5	5
324	432	0.0	62.2	7.7	10.8	5	5	5
325	1081	0.0	62.2	7.7	10.8	5	5	5
326	494	0.0	62.2	7.7	10.8	5	5	5
327	244	0.0	62.2	7.7	10.8	5	5	5
328	213	0.0	62.3	7.7	10.8	5	5	5
329	471	0.0	62.3	7.7	10.8	5	5	5
330	945	0.0	62.3	7.7	10.8	5	5	5
331	489	0.0	62.3	7.7	10.8	5	5	5
332	1063	0.0	62.3	7.7	10.8	5	5	5
333	1029	0.0	62.3	7.7	10.8	5	5	5
334	334	0.0	62.3	7.7	10.8	5	5	5
335	239	0.0	62.3	7.7	10.8	5	5	5
336	1273	0.0	62.3	7.7	10.8	5	5	5
337	1181	0.0	62.3	7.7	10.8	5	5	5
338	1079	0.0	62.3	7.7	10.8	5	5	5
339	1396	0.2	62.5	7.0	10.7	6	5	5
340	801	0.0	62.5	6.9	10.7	9	7	7
341	98	3.7	66.2	6.6	10.4	8	8	8
342	10	0.3	66.5	6.6	10.3	8	8	8
343	641	0.0	66.6	6.6	10.3	8	8	8
344	408	0.0	66.6	6.6	10.3	8	8	8
345	1032	0.0	66.6	6.6	10.3	7	8	8
346	936	0.0	66.6	6.6	10.3	[illegible]	8	8
347	463	0.0	66.6	6.6	10.3	8	8	8
348	149	0.1	66.7	6.4	10.3	9	8	8
349	731	0.5	67.1	6.0	10.3	8	5	5
350	846	0.3	67.4	6.0	10.2	9	5	5

	TERRAIN UNIT #	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
351	1326	0.3	67.7	6.0	10.2	6	5	5
352	654	0.2	68.0	6.0	10.2	9	5	5
353	1308	0.2	68.2	6.0	10.2	6	5	5
354	777	0.2	68.4	6.0	[illegible]	9	5	5
355	833	0.1	68.5	[illegible]	10.1	9	5	5
356	789	0.1	68.6	6.0	10.1	9	5	5
357	135	0.1	68.7	6.0	10.1	9	5	5
358	793	0.1	68.7	6.0	10.1	9	5	5
359	725	0.1	68.8	6.0	10.1	9	5	5
360	1321	0.1	68.9	6.0	10.1	6	5	5
361	843	0.1	68.9	6.0	10.1	9	5	5
362	774	0.0	69.0	6.0	10.1	9	5	5
363	804	0.0	69.0	6.0	10.1	9	5	5
364	744	0.0	69.0	6.0	10.1	9	5	5
365	861	0.0	69.0	6.0	10.1	9	5	5
366	979	0.0	69.1	6.0	10.1	6	5	5
367	779	0.0	69.1	6.0	10.1	9	5	5
368	1289	0.0	69.1	6.0	10.1	6	5	5
369	770	0.0	69.1	6.0	10.1	9	5	5
370	158	0.0	69.1	6.0	10.1	9	5	5
371	859	0.0	69.1	6.0	10.1	9	5	5
372	877	0.0	69.1	6.0	10.1	9	5	5
373	186	0.2	69.3	5.8	10.1	6	5	5
374	915	0.1	69.4	5.8	10.0	6	5	5
375	187	0.1	69.5	5.8	10.0	6	5	5
376	1404	0.0	69.5	5.8	10.0	6	5	5
377	133	0.2	69.8	5.5	10.0	9	8	8
378	768	0.0	69.8	5.5	10.0	9	8	8
379	872	0.0	69.8	5.5	10.0	9	8	8
380	978	0.1	69.8	5.2	10.0	8	8	8
381	176	0.0	69.9	5.1	10.0	9	7	7
382	1318	0.1	69.9	4.6	10.0	9	9	8
383	185	1.7	71.6	4.4	9.7	8	9	8
384	908	0.3	71.9	4.4	9.6	8	9	8
385	165	0.0	72.0	4.4	9.6	8	9	8
386	504	0.0	72.0	3.9	9.6	10	10	10
387	184	0.0	72.0	3.8	9.6	8	5	5
388	182	0.0	72.0	3.8	9.6	8	5	5
389	901	0.0	72.1	3.6	9.6	8	8	8
390	1046	6.6	78.6	3.0	8.1	5	5	5
391	1152	4.5	83.1	3.0	7.4	5	5	5
392	681	1.3	84.4	3.0	7.3	5	5	5
393	840	1.2	85.6	3.0	7.1	5	5	5
394	929	0.5	86.1	3.0	7.1	5	5	5
395	741	0.2	86.3	3.0	7.0	5	5	5
396	780	0.2	86.4	3.0	7.0	5	5	5
397	138	0.1	86.6	3.0	7.0	5	5	5
398	25	0.1	86.7	3.0	7.0	5	5	5
399	1365	0.1	86.9	3.0	7.0	5	5	5
400	528	0.1	87.0	3.0	7.0	5	5	5

(Continued)

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Table D1 (Continued)

TERRAIN UNIT#		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN	TERRAIN UNIT#		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
401	1403	0.1	87.1	3.0	7.0	5	5	5	442	272	0.0	88.7	3.0	6.8	5	5	5
402	1119	0.1	87.2	3.0	7.0	5	5	5	443	1149	0.0	88.7	3.0	6.8	5	5	5
403	1118	0.1	87.3	3.0	6.9	5	5	5	444	425	0.0	88.7	3.0	6.8	5	5	5
404	743	0.1	87.4	3.0	6.9	5	5	5	445	1061	0.0	88.7	3.0	6.8	5	5	5
405	1122	0.1	87.4	3.0	6.9	5	5	5	446	1066	0.0	88.7	3.0	6.8	5	5	5
406	103	0.1	87.5	3.0	6.9	5	5	5	447	1144	0.0	88.7	3.0	6.8	5	5	5
407	48	0.1	87.6	3.0	6.9	5	5	5	448	263	0.0	88.7	3.0	6.8	5	5	5
408	1227	0.1	87.7	3.0	6.9	5	5	5	449	455	0.0	88.7	3.0	6.8	5	5	5
409	409	0.1	87.8	3.0	6.9	5	5	5	450	148	3.2	91.9	2.6	6.4	8	8	8
410	400	0.1	87.8	3.0	6.9	5	5	5	451	53	2.4	94.3	2.6	6.2	8	8	8
411	1130	0.1	87.9	3.0	6.9	5	5	5	452	270	2.2	96.6	2.6	6.0	8	8	8
412	1397	0.1	88.0	3.0	6.9	5	5	5	453	819	1.7	98.3	2.6	5.9	8	8	8
413	682	0.1	88.0	3.0	6.9	5	5	5	454	694	0.2	98.5	2.6	5.9	8	8	8
414	919	0.1	88.1	3.0	6.9	5	5	5	455	45	0.2	98.7	2.6	5.8	8	8	8
415	539	0.0	88.1	3.0	6.9	5	5	5	456	276	0.1	98.8	2.6	5.8	8	8	8
416	791	0.0	88.2	3.0	6.9	5	5	5	457	435	0.1	98.9	2.6	5.8	8	8	8
417	614	0.5	88.2	3.0	6.8	5	5	5	458	307	0.1	99.0	2.6	5.8	8	8	8
418	829	0.0	88.2	3.0	6.8	5	5	5	459	1277	0.1	99.1	2.6	5.8	5	5	5
419	590	0.0	88.3	3.0	6.8	5	5	5	460	1317	0.0	99.1	2.6	5.8	5	5	5
420	157	0.0	88.3	3.0	6.8	5	5	5	461	531	0.0	99.1	2.6	5.8	8	8	8
421	1260	0.0	88.4	3.0	6.8	5	5	5	462	1033	0.0	99.1	2.6	5.8	5	5	5
422	955	0.0	88.4	3.0	6.8	5	5	5	463	944	0.0	99.1	2.6	5.8	8	8	8
423	1388	0.0	88.4	3.0	6.8	5	5	5	464	723	0.1	99.2	2.4	5.8	10	10	10
424	1065	0.0	88.4	3.0	6.8	5	5	5	465	481	0.0	99.2	2.2	5.8	8	8	8
425	636	0.0	88.5	3.0	6.8	5	5	5	466	474	0.0	99.3	2.2	5.8	5	5	5
426	751	0.0	88.5	3.0	6.8	5	5	5	467	1034	0.0	99.3	2.2	5.8	5	5	5
427	593	0.0	88.5	3.0	6.8	5	5	5	468	486	0.0	99.3	2.2	5.8	8	8	8
428	159	0.0	88.5	3.0	6.8	5	5	5	469	879	0.0	99.3	2.2	5.8	10	10	10
429	219	0.0	88.6	3.0	6.8	5	5	5	470	482	0.1	99.4	0.8	5.8	8	8	8
430	800	0.0	88.6	3.0	6.8	5	5	5	471	700	0.1	99.4	0.7	5.7	8	8	8
431	870	0.0	88.6	3.0	6.8	5	5	5	472	665	0.0	99.4	0.6	5.7	8	8	8
432	247	0.0	88.6	3.0	6.8	5	5	5	473	1407	0.2	99.6	0.1	5.2	2	2	2
433	1311	0.0	88.6	3.0	6.8	5	5	5	474	1070	0.1	99.7	0.1	4.9	3	3	3
434	1090	0.0	88.6	3.0	6.8	5	5	5	475	1355	0.1	99.8	0.1	4.7	2	2	2
435	1044	0.0	88.7	3.0	6.8	5	5	5	476	928	0.1	99.9	0.1	4.6	2	2	2
436	1057	0.0	88.7	3.0	6.8	5	5	5	477	1170	0.1	99.9	0.1	4.5	3	3	3
437	144	0.0	88.7	3.0	6.8	5	5	5	478	62	0.0	100.0	0.1	4.4	3	3	3
438	1229	0.0	88.7	3.0	6.8	5	5	5	479	932	0.0	100.0	0.1	4.3	2	2	2
439	23	0.0	88.7	3.0	6.8	5	5	5	480	927	0.0	100.0	0.1	4.3	2	2	2
440	842	0.0	88.7	3.0	6.8	5	5	5	481	929	0.0	100.0	0.1	4.3	2	2	2
441	293	0.0	88.7	3.0	6.8	5	5	5									

(Continued)

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Table DI (Concluded)

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N= 50	N=100	N=150	N=200	N=250	N=300	N=350	N=400	N=450	N=491	REASONS FOR NO-GO
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	OBSTACLE INTERFERENCE
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	TRACTION AVAILABLE < SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
											REASONS FOR LIMITING SPEED
5	17.7	15.5	16.3	13.4	28.0	48.7	46.6	54.9	53.9	49.7	RIDE DYNAMICS
6	57.1	57.8	51.8	43.6	35.9	25.6	23.4	18.5	17.5	16.1	SURFACE AND SLOPE RESISTANCES
7	22.7	24.2	21.9	17.4	14.5	10.4	9.4	7.3	6.9	6.4	VISIBILITY
8	0.0	0.1	2.7	6.8	5.5	3.9	9.9	9.6	12.6	18.9	MANEUVER
9	1.9	0.8	6.9	13.1	15.4	11.0	10.2	9.2	8.7	8.0	SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
10	0.6	0.6	0.4	0.8	0.7	0.5	0.4	0.3	0.3	0.4	ACCELERATION AND DECELERATION BETWEEN OBSTACLES

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Table D2

Thailand Wet-Season Off-Road Speed Predictions for M35A2 2-1/2-Ton, 6x6 Cargo Truck

Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down	Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
T1	57	0.0	0.0	23.6	23.6	9	9	8	51	193	0.1	11.4	8.3	8.9	6	7	7
2	161	0.0	0.1	21.2	22.2	9	9	9	52	198	0.1	11.5	8.3	8.9	6	7	7
3	183	0.1	0.1	20.5	21.2	8	9	8	53	438	0.1	11.6	8.3	8.9	9	7	7
4	16	0.2	0.3	18.4	19.6	7	7	7	54	265	0.1	11.7	8.3	8.9	9	7	7
5	79	0.3	0.6	17.6	18.6	8	7	7	55	180	0.0	11.7	8.3	8.9	6	7	7
6	127	0.0	0.7	17.6	18.5	8	8	8	56	245	0.0	11.7	8.3	8.9	9	7	7
7	154	[illegible]	0.7	17.6	18.5	8	7	7	57	101	0.0	11.7	8.3	8.9	6	7	7
8	176	0.2	0.8	16.9	18.2	9	8	8	58	145	0.0	11.7	8.3	8.9	10	10	10
9	193	0.1	0.9	14.4	17.8	8	9	8	59	63	0.0	11.7	8.3	8.9	10	10	10
10	126	0.1	1.0	14.3	17.4	7	7	7	60	479	0.1	11.8	8.2	8.9	9	7	7
11	392	0.1	1.0	11.2	16.9	8	8	8	61	334	0.0	11.8	8.1	8.9	9	7	7
12	2	0.2	1.2	11.0	15.6	7	7	7	62	336	0.0	11.8	8.1	8.9	9	7	7
13	81	0.1	1.4	11.0	15.0	7	7	7	63	337	0.0	11.8	8.1	8.9	9	7	7
14	318	0.1	1.4	11.0	14.8	7	7	7	64	35	0.4	12.3	7.7	8.9	5	5	5
15	156	0.0	1.5	11.0	14.7	7	7	7	65	261	0.4	12.7	7.7	8.8	5	5	5
16	418	0.1	1.5	10.2	14.3	9	8	8	66	187	0.4	13.1	7.7	8.8	5	5	5
17	171	0.1	1.7	9.6	13.7	9	8	7	67	429	0.3	13.4	7.7	8.8	5	5	5
18	394	0.0	1.7	9.6	13.6	9	9	7	68	23	0.3	13.7	7.7	8.7	5	5	5
19	179	0.1	1.8	9.2	13.3	9	8	7	69	17	0.2	13.9	7.7	8.7	5	5	5
20	151	0.0	1.8	9.1	13.3	9	8	8	70	47	0.2	14.1	7.7	8.7	5	5	5
21	285	1.2	3.0	8.5	10.9	7	7	7	71	10	0.2	14.2	7.7	8.7	5	5	5
22	317	0.8	3.8	8.5	10.2	7	7	7	72	191	0.2	14.4	7.7	8.7	5	5	5
23	251	0.4	4.3	8.5	10.0	7	7	7	73	184	0.1	14.5	7.7	8.7	5	5	5
24	55	0.4	4.7	8.5	9.9	7	7	7	74	50	0.1	14.6	7.7	8.7	5	5	5
25	80	0.3	5.0	8.5	9.8	7	7	7	75	125	0.1	14.8	7.7	8.6	5	5	5
26	299	0.3	5.3	8.5	9.7	7	7	7	76	18	0.1	14.9	7.7	8.6	5	5	5
27	60	0.2	5.4	8.5	9.7	7	7	7	77	163	0.1	15.0	7.7	8.6	5	5	5
28	74	0.1	5.5	8.5	9.6	7	7	7	78	3	0.1	15.1	7.7	8.6	5	5	5
29	8	0.1	5.7	8.5	9.6	7	7	7	79	130	0.1	15.2	7.7	8.6	5	5	5
30	44	0.1	5.8	8.5	9.6	7	7	7	80	412	0.1	15.2	7.7	8.6	5	5	5
31	322	0.1	5.8	8.5	9.6	7	7	7	81	287	0.0	15.3	7.7	8.6	5	5	5
32	87	0.1	5.9	8.5	9.6	7	7	7	82	332	0.0	15.3	7.7	8.6	10	10	10
33	120	0.0	6.0	8.5	9.6	7	7	7	83	149	0.2	15.4	7.7	8.6	5	5	5
34	174	0.0	6.0	8.5	9.5	7	7	7	84	26	0.0	15.4	7.7	8.6	5	5	5
35	131	0.0	6.0	8.5	9.5	7	7	7	85	153	0.0	15.4	7.7	8.6	5	5	5
36	328	0.0	6.0	8.5	9.5	7	7	7	86	56	0.0	15.4	7.7	8.6	5	5	5
37	325	0.0	6.0	8.5	9.5	7	7	7	87	477	0.1	15.5	7.6	8.6	10	10	10
38	320	0.0	6.0	8.5	9.5	7	7	7	88	263	0.0	15.6	7.6	8.6	10	10	10
39	323	0.0	6.0	8.5	9.5	7	7	7	89	153	0.0	15.6	7.5	8.6	10	10	10
40	15	0.0	6.0	8.5	9.5	7	7	7	90	329	0.9	16.5	7.2	8.5	10	10	10
41	254	1.2	7.2	8.4	9.3	7	7	7	91	90	0.4	16.9	7.2	8.5	10	10	10
42	410	1.2	8.4	8.4	9.2	7	7	7	92	873	0.1	17.0	7.2	8.5	10	10	10
43	251	0.6	9.0	8.4	9.1	7	7	7	93	197	0.0	17.1	7.2	8.4	8	8	8
44	389	0.4	9.4	8.4	9.1	7	7	7	94	450	0.0	17.1	7.2	8.4	10	10	10
45	266	0.0	9.4	8.4	9.1	7	7	7	95	271	6.1	23.1	7.1	8.0	10	10	10
46	439	0.8	10.2	8.3	9.0	9	7	7	96	354	1.0	24.1	7.1	8.0	6	9	9
47	202	0.4	10.6	8.3	9.0	6	7	7	97	348	0.3	24.4	7.1	8.0	6	9	9
48	393	0.4	11.0	8.3	9.0	9	7	7	98	309	2.2	26.7	6.9	7.9	10	10	10
49	99	0.1	11.1	8.3	9.0	6	7	7	99	33	0.2	26.9	6.9	7.9	10	10	10
50	52	0.1	11.3	8.3	9.0	6	7	7	100	145	0.1	27.0	6.9	7.9	10	10	10

(Continued)

(1 of 3 sheets)

Table D2 (Continued)

TERRAIN UNIT		% DISTANCE		PREDICTED SPEED		FACTOR LIMITING SPEED			TERRAIN UNIT		% DISTANCE		PREDICTED SPEED		FACTOR LIMITING SPEED		
		IN UNIT	ACCUM	IN UNIT	ACCUM	UP	LEVEL	DOWN			IN UNIT	ACCUM	IN UNIT	ACCUM	UP	LEVEL	DOWN
101	265	0.1	27.1	6.9	7.9	9	9	9	151	63	0.0	64.0	5.6	7.1	7	7	7
102	215	0.0	27.1	6.9	7.9	6	7	7	152	338	0.0	64.0	5.6	7.1	7	7	10
103	453	23.4	50.6	6.8	7.3	10	10	10	153	391	0.0	64.0	5.6	7.1	7	7	7
104	445	5.6	56.2	6.8	7.3	10	10	10	154	107	0.0	64.1	5.6	7.1	6	10	10
105	382	0.3	56.5	6.8	7.3	6	8	5	155	321	0.0	64.1	5.6	7.1	7	7	7
106	28	0.2	56.7	6.8	7.3	10	10	10	156	262	0.0	64.1	5.6	7.1	7	7	7
107	274	0.1	56.8	6.8	7.3	10	10	10	157	123	0.0	64.1	5.6	7.1	7	7	7
108	385	0.1	56.9	6.8	7.3	6	8	5	158	38	0.0	64.1	5.6	7.1	7	7	7
109	181	0.1	56.9	6.7	7.3	8	8	8	159	82	0.0	64.1	5.6	7.1	7	7	7
110	178	0.0	57.0	6.7	7.3	8	8	8	160	4	0.0	64.1	5.6	7.1	7	7	7
111	134	0.0	57.0	6.7	7.3	8	8	8	161	70	0.0	64.1	5.6	7.1	7	7	7
112	349	0.5	57.5	6.6	7.3	9	9	9	162	175	0.0	64.1	5.6	7.1	7	7	7
113	355	0.2	57.7	6.6	7.3	9	9	9	163	132	0.0	64.1	5.6	7.1	7	7	7
114	258	0.1	57.8	6.6	7.3	9	8	9	164	289	0.0	64.1	5.6	7.1	7	7	7
115	363	0.0	57.8	6.6	7.3	9	9	9	165	41	0.0	64.1	5.6	7.1	7	7	7
116	209	0.0	57.8	6.6	7.3	10	10	10	166	58	0.0	64.1	5.6	7.1	7	7	7
117	356	0.1	57.9	6.5	7.3	8	8	8	167	230	0.3	64.4	5.5	7.1	9	10	10
118	454	0.1	58.0	6.5	7.3	10	10	10	168	343	0.1	64.4	5.5	7.1	6	7	7
119	357	0.1	58.2	6.5	7.3	8	8	8	169	118	0.0	64.4	5.5	7.1	6	5	7
120	381	0.1	58.3	6.4	7.3	8	9	5	170	443	0.0	64.5	5.5	7.1	10	10	7
121	383	0.1	58.3	6.2	7.2	9	9	9	171	458	0.0	64.5	5.5	7.1	10	10	7
122	423	0.0	58.4	6.2	7.2	9	9	8	172	478	0.2	64.6	5.4	7.1	10	10	10
123	366	0.4	58.7	6.1	7.2	10	10	10	173	34	0.1	64.6	5.4	7.1	10	10	10
124	105	0.1	58.8	6.1	7.2	6	7	7	174	485	0.0	64.8	5.4	7.1	10	10	10
125	387	0.1	58.9	6.1	7.2	10	10	10	175	192	0.3	64.8	5.4	7.1	9	7	7
126	210	0.0	58.9	6.1	7.2	10	10	10	176	240	0.2	65.0	5.0	7.0	9	7	7
127	379	0.8	59.7	6.0	7.2	10	10	10	177	112	0.0	65.0	4.9	7.0	6	7	7
128	225	0.1	59.8	6.0	7.2	6	5	7	178	218	0.0	65.0	4.9	7.0	6	7	7
129	214	0.0	59.9	6.0	7.2	6	5	7	179	217	0.0	65.0	4.9	7.0	6	7	7
130	212	0.0	59.9	6.0	7.2	6	5	7	180	213	0.0	65.0	4.9	7.0	6	7	7
131	279	0.0	59.9	5.9	7.2	10	10	10	181	233	0.2	65.2	4.7	7.0	9	5	5
132	250	1.3	61.2	5.6	7.2	7	7	7	182	116	0.1	65.4	4.4	7.0	9	10	10
133	405	0.6	61.8	5.6	7.1	7	7	7	183	22	0.1	65.5	4.2	7.0	9	9	5
134	48	0.4	62.2	5.6	7.1	7	7	7	184	357	0.2	65.7	3.7	7.0	9	9	9
135	253	0.2	62.5	5.6	7.1	7	7	7	185	358	0.1	65.8	3.7	7.0	9	9	9
136	398	0.2	62.7	5.6	7.1	7	7	7	186	351	0.1	65.9	3.7	7.0	9	9	9
137	12	0.2	62.9	5.6	7.1	7	7	7	187	384	0.0	65.9	3.7	7.0	9	9	9
138	162	0.2	63.0	5.6	7.1	7	7	7	188	276	14.5	80.4	3.0	5.6	5	5	5
139	37	0.2	63.2	5.6	7.1	7	7	7	189	372	9.4	89.8	3.0	5.2	5	5	5
140	353	0.2	63.4	5.6	7.1	7	7	7	190	11	0.3	90.1	3.0	5.1	5	5	5
141	59	0.1	63.5	5.6	7.1	7	7	7	191	268	0.2	90.2	3.0	5.1	5	5	5
142	401	0.1	63.6	5.6	7.1	7	7	7	192	275	0.1	90.3	3.0	5.1	5	5	5
143	203	0.1	63.7	5.6	7.1	7	7	7	193	33	0.1	90.4	3.0	5.1	5	5	5
144	167	0.1	63.7	5.6	7.1	7	7	7	194	7	0.1	90.5	3.0	5.1	5	5	5
145	428	0.1	63.8	5.6	7.1	7	7	7	195	224	0.1	90.5	3.0	5.1	5	5	5
146	264	0.0	63.8	5.6	7.1	7	7	7	196	455	0.1	90.6	3.0	5.1	5	5	5
147	189	0.0	63.9	5.6	7.1	7	7	7	197	173	0.0	90.6	3.0	5.1	5	5	5
148	6	0.0	63.9	5.6	7.1	7	7	7	198	180	0.0	90.7	3.0	5.1	5	5	5
149	138	0.0	64.0	5.6	7.1	7	7	7	199	278	0.0	90.7	3.0	5.1	5	5	5
150	427	0.0	64.0	5.6	7.1	7	7	7	200	113	0.0	90.7	3.0	5.1	5	5	5

(Continued)

(2 of 3 sheets)

Table No. D2 (Concluded)

	TERRAIN UNITS	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
T201	298	0.0	92.7	3.0	5.1	5	5	5
202	424	0.0	92.7	3.0	5.1	5	5	5
203	307	0.0	92.7	3.0	5.1	5	5	5
204	302	0.0	92.8	3.0	5.1	5	5	5
205	451	0.7	91.5	2.6	5.1	5	5	5
206	277	0.7	92.1	2.6	5.0	5	5	5
207	72	0.3	92.5	2.6	5.0	5	5	5
208	165	0.1	92.6	2.6	5.0	5	5	5
209	331	0.1	92.7	2.6	5.0	5	5	5
210	465	0.0	92.8	2.6	5.0	5	5	5
211	468	0.0	92.8	2.6	5.0	8	8	8
212	95	0.0	92.8	2.6	5.0	5	5	5
213	358	0.0	92.8	2.6	5.0	5	5	5
214	376	0.2	92.9	2.3	5.0	8	6	8
215	67	1.1	94.0	2.2	4.9	5	5	5
216	303	0.4	94.4	2.2	4.9	5	5	5
217	102	0.3	94.7	2.2	4.9	5	5	5
218	227	0.3	95.0	2.2	4.9	5	5	5
219	272	0.3	95.3	2.2	4.8	5	5	5
220	45	0.2	95.5	2.2	4.8	5	5	5
221	150	0.1	95.7	2.2	4.8	5	5	5
222	226	0.1	95.8	2.2	4.8	5	5	5
223	371	0.1	95.9	2.2	4.8	5	5	5
224	313	0.1	96.0	2.2	4.8	5	5	5
225	278	0.0	96.1	2.2	4.8	5	5	5
226	229	0.0	96.1	2.2	4.8	5	5	5
227	149	0.0	96.1	2.2	4.8	5	5	5
228	152	0.0	96.2	2.2	4.8	5	5	5
229	239	0.0	96.2	2.2	4.8	5	5	5
230	369	0.0	96.2	2.2	4.8	5	5	5
231	314	0.0	96.2	2.2	4.8	5	5	5
232	319	0.0	96.2	2.2	4.8	5	5	5
233	241	0.7	96.9	0.1	3.6	4	4	4
234	478	0.5	97.4	0.1	3.0	3	3	3
235	418	0.5	97.9	0.1	2.7	4	4	4
236	476	0.4	98.3	0.1	2.4	3	3	3
237	428	0.3	98.7	0.1	2.2	3	3	3
238	469	0.3	99.0	0.1	2.1	3	3	3
239	284	0.2	99.2	0.1	2.0	3	3	3
240	258	0.2	99.4	0.1	1.9	4	4	4
241	482	0.1	99.5	0.1	1.9	4	4	4
242	473	0.1	99.6	0.1	1.9	3	3	3
243	281	0.1	99.7	0.1	1.8	4	4	4
244	244	0.1	99.7	0.1	1.8	4	4	4
245	468	0.0	99.8	0.1	1.8	3	3	3
246	396	0.0	99.8	0.1	1.8	4	4	4
247	388	0.0	99.9	0.1	1.8	4	4	4
248	381	0.0	99.9	0.1	1.8	4	4	4
249	115	0.0	99.9	0.1	1.8	4	4	4
250	32	0.0	99.9	0.1	1.7	3	3	3
251	377	0.0	100.0	0.1	1.7	4	4	4
252	471	0.0	100.0	0.1	1.7	3	3	3
253	457	0.0	100.0	0.1	1.7	4	4	4
254	387	0.0	100.0	0.1	1.7	4	4	4
255	238	0.0	100.0	0.1	1.7	4	4	4

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N= 50	N=100	N=150	N=200	N=250	N=255	N=	
								REASONS FOR NO-GO
1	0.0	0.0	0.0	0.0	0.0	0.0		SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	0.0	0.0	0.0	0.0	0.0		TRACTION AVAILIABLE < SURFACE AND SLOPE RESISTANCES
3	0.0	0.0	0.0	0.0	2.0	2.0		OBSTACLE INTERFERENCE
4	0.0	0.0	0.0	0.0	1.7	1.8		TRACTION AVAILIABLE < SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
								REASONS FOR LIMITING SPEED
5	0.0	13.0	5.8	31.6	34.8	34.8		RIDE DYNAMICS
6	1.9	2.7	1.5	1.1	1.6	1.6		SURFACE AND SLOPE RESISTANCES
7	87.3	37.8	22.6	18.2	14.7	14.7		VISIBILITY
8	4.8	2.2	1.6	1.1	1.2	1.2		MANEUVER
9	5.9	6.0	4.3	3.9	3.6	3.6		SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
10	0.0	35.3	64.2	46.8	41.7	41.7		ACCELERATION AND DECELERATION BETWEEN OBSTACLES

(3 of 3 sheets)

Table D3

Arizona Wet-Season Off-Road Speed Predictions for M35A2 2-1/2-Ton, 6x6 Cargo Truck

TERRAIN UNITS		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN	TERRAIN UNITS		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
1	2	0.1	0.1	31.8	31.8	7	7	7	51	143	2.0	44.6	7.7	15.1	5	5	5
2	32	0.0	0.1	31.8	31.8	7	7	7	52	23	0.1	44.7	7.7	15.1	5	5	5
3	27	0.0	0.2	31.8	31.8	7	7	7	53	9	0.1	44.8	7.7	15.0	5	5	5
4	22	0.0	0.2	31.8	31.8	7	7	7	54	282	0.0	44.8	7.7	15.0	5	5	5
5	151	0.1	0.2	31.7	31.8	7	7	7	55	30	0.0	44.9	7.7	15.0	5	5	5
6	147	0.0	0.3	31.7	31.8	7	7	7	56	90	0.2	45.1	7.6	14.9	10	10	10
7	94	0.0	0.3	28.4	31.3	10	10	10	57	241	0.1	45.1	7.6	14.9	10	10	10
8	201	0.0	0.3	28.2	31.2	9	7	7	58	116	0.0	45.2	7.6	14.9	10	10	10
9	248	0.2	0.5	26.9	29.3	8	8	8	59	172	0.0	45.2	7.6	14.9	10	10	10
10	97	16.6	17.1	25.0	25.1	10	10	10	60	185	0.0	45.2	7.6	14.9	10	10	10
11	91	0.2	17.4	25.0	25.1	10	10	10	61	345	0.0	45.2	7.6	14.9	6	5	5
12	99	0.2	17.6	25.0	25.1	10	10	10	62	379	0.0	45.3	7.5	14.9	10	10	10
13	109	0.1	17.6	25.0	25.1	10	10	10	63	332	0.0	45.3	7.5	14.9	10	10	10
14	185	0.0	17.7	24.9	25.1	10	10	10	64	376	0.0	45.3	7.5	14.9	10	10	10
15	250	0.1	17.8	22.9	25.1	10	10	10	65	88	0.1	45.4	7.0	14.8	8	8	8
16	251	0.1	17.9	22.9	25.1	10	10	10	66	170	0.0	45.5	7.0	14.8	8	8	8
17	203	0.9	18.8	20.0	24.5	5	5	5	67	128	1.2	46.7	6.9	14.4	10	10	10
18	22	0.1	18.9	20.0	24.7	5	5	5	68	131	0.3	46.9	6.9	14.3	10	10	10
19	21	0.0	18.9	20.0	24.7	5	5	5	69	65	0.2	47.2	6.9	14.2	10	10	10
20	6	0.0	18.9	20.0	24.7	5	5	5	70	297	0.0	47.2	6.9	14.2	10	10	10
21	171	0.2	19.1	19.0	24.7	10	10	10	71	81	0.3	47.5	5.4	14.1	10	10	10
22	325	0.0	19.1	18.1	24.6	10	10	10	72	139	0.2	47.7	5.4	14.0	10	10	10
23	371	0.0	19.1	18.1	24.6	10	10	10	73	87	0.1	47.7	5.4	14.0	10	10	10
24	119	4.1	23.3	17.7	23.0	10	10	10	74	141	0.0	47.8	5.4	13.9	10	10	10
25	96	2.1	25.3	17.7	22.5	10	10	10	75	238	0.0	47.8	5.4	13.9	10	10	10
26	245	0.3	25.7	17.7	22.4	10	10	10	76	84	0.0	47.8	5.4	13.9	10	10	10
27	193	0.3	26.0	17.7	22.3	10	10	10	77	110	1.6	49.4	3.8	12.4	5	5	5
28	254	0.3	26.3	17.7	22.3	10	10	10	78	101	0.6	50.0	3.8	12.0	5	5	5
29	186	0.2	26.5	17.7	22.2	10	10	10	79	234	0.4	50.4	3.8	11.7	5	5	5
30	273	0.0	26.5	17.3	22.2	9	5	5	80	121	0.3	50.7	3.8	11.5	5	5	5
31	318	0.1	26.6	15.6	22.2	10	10	10	81	22	0.3	51.0	3.8	11.3	5	5	5
32	338	0.6	27.2	13.4	21.9	6	7	7	82	165	0.2	51.2	3.8	11.2	5	5	5
33	349	0.0	27.2	13.4	21.9	6	7	7	83	118	0.2	51.4	3.8	11.1	5	5	5
34	365	0.0	27.3	12.9	21.8	10	10	10	84	52	0.1	51.5	3.8	11.0	5	5	5
35	344	0.1	27.3	12.4	21.8	6	5	7	85	137	0.1	51.7	3.8	10.9	5	5	5
36	377	0.1	27.4	12.3	21.8	10	10	10	86	26	0.1	51.8	3.8	10.9	5	5	5
37	350	0.0	27.4	11.6	21.7	5	5	7	87	111	0.1	51.9	3.8	10.8	5	5	5
38	69	0.2	27.6	11.3	21.6	10	10	10	88	44	0.1	52.0	3.8	10.8	5	5	5
39	49	0.0	27.7	11.3	21.6	10	10	10	89	233	0.1	52.0	3.8	10.7	5	5	5
40	197	0.0	27.7	11.2	21.5	10	10	10	90	19	0.1	52.1	3.8	10.7	5	5	5
41	365	0.0	27.7	10.8	21.5	8	8	8	91	232	0.1	52.2	3.8	10.7	5	5	5
42	58	11.3	39.0	10.6	16.5	10	10	10	92	219	0.1	52.3	3.8	10.6	5	5	5
43	222	3.1	42.1	10.6	15.9	10	10	10	93	385	0.1	52.3	3.8	10.6	5	5	5
44	71	0.3	42.3	10.6	15.9	10	10	10	94	231	0.0	52.4	3.8	10.6	5	5	5
45	206	0.1	42.4	10.6	15.9	10	10	10	95	215	0.0	52.4	3.8	10.6	5	5	5
46	164	0.1	42.5	10.6	15.8	10	10	10	96	363	0.0	52.4	3.8	10.5	5	5	5
47	88	0.0	42.5	10.6	15.8	10	10	10	97	281	0.0	52.4	3.8	10.5	5	5	5
48	299	0.0	42.5	10.0	15.8	10	10	10	98	288	0.0	52.5	3.3	10.5	5	5	5
49	382	0.1	42.6	8.0	15.8	10	10	10	99	82	0.0	52.5	3.3	10.5	5	5	5
50	354	0.0	42.6	7.9	15.8	10	10	10	100	269	0.0	52.5	3.2	10.5	5	5	5

(Continued)

(1 of 3 sheets)

Table D3 (Continued)

Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
101	326	0.0	52.5	3.0	10.5	5	5	5
102	146	0.0	52.5	3.0	10.5	5	5	5
103	209	0.0	52.5	3.0	10.5	5	5	5
104	154	0.0	52.5	3.0	10.5	5	5	5
105	59	4.8	57.3	2.6	8.4	5	5	5
106	42	2.0	59.3	2.6	7.8	5	5	5
107	79	0.5	59.8	2.6	7.7	5	5	5
108	107	0.5	60.3	2.6	7.5	5	5	5
109	120	0.5	60.8	2.6	7.4	5	5	5
110	76	0.4	61.3	2.6	7.3	5	5	5
111	114	0.4	61.7	2.6	7.2	5	5	5
112	78	0.3	62.0	2.6	7.2	5	5	5
113	117	0.1	62.1	2.6	7.1	5	5	5
114	307	0.1	62.2	2.6	7.1	5	5	5
115	168	0.1	62.4	2.6	7.1	5	5	5
116	244	0.1	62.5	2.6	7.1	5	5	5
117	10	0.1	62.6	2.6	7.0	5	5	5
118	339	0.1	62.7	2.6	7.0	5	5	5
119	242	0.1	62.7	2.6	7.0	5	5	5
120	80	0.1	62.8	2.6	7.0	5	5	5
121	200	0.0	62.8	2.6	7.0	5	5	5
122	340	0.0	62.9	2.6	7.0	5	5	5
123	364	0.0	62.9	2.6	7.0	5	5	5
124	319	0.0	62.9	2.6	7.0	5	5	5
125	12	0.0	63.0	2.6	7.0	5	5	5
126	92	0.0	63.0	2.6	7.0	5	5	5
127	124	0.0	63.0	2.6	7.0	5	5	5
128	264	0.0	63.1	2.6	7.0	5	5	5
129	265	0.0	63.1	2.6	7.0	5	5	5
130	132	0.0	63.1	2.6	7.0	5	5	5
131	179	0.0	63.1	2.6	6.9	5	5	5
132	235	0.0	63.1	2.6	6.9	5	5	5
133	378	0.0	63.1	2.6	6.9	5	5	5
134	5	12.0	75.1	2.2	5.2	5	5	5
135	6	3.1	78.2	2.2	4.9	5	5	5
136	156	2.7	80.8	2.2	4.7	5	5	5
137	68	0.9	81.7	2.2	4.7	5	5	5
138	127	0.6	82.3	2.2	4.6	5	5	5
139	272	0.5	82.8	2.2	4.6	5	5	5
140	78	0.5	83.3	2.2	4.6	5	5	5
141	122	0.4	83.7	2.2	4.5	5	5	5
142	47	0.3	84.0	2.2	4.5	5	5	5
143	35	0.3	84.3	2.2	4.5	5	5	5
144	184	0.2	84.5	2.2	4.5	5	5	5
145	258	0.2	84.7	2.2	4.5	5	5	5
146	113	0.2	84.9	2.2	4.5	5	5	5
147	255	0.2	85.0	2.2	4.5	5	5	5
148	370	0.1	85.2	2.2	4.5	5	5	5
149	128	0.1	85.3	2.2	4.4	5	5	5
150	292	0.1	85.4	2.2	4.4	5	5	5
151	122	0.1	85.6	2.2	4.4	5	5	5
152	259	0.1	85.7	2.2	4.4	5	5	5
153	190	0.1	85.8	2.2	4.4	5	5	5
154	237	0.1	85.8	2.2	4.4	5	5	5
155	180	0.1	85.9	2.2	4.4	5	5	5
156	50	0.1	86.0	2.2	4.4	5	5	5
157	144	0.1	86.0	2.2	4.4	5	5	5
158	245	0.1	86.1	2.2	4.4	5	5	5
159	316	0.1	86.2	2.2	4.4	5	5	5
160	159	0.1	86.2	2.2	4.4	5	5	5
161	180	0.1	86.3	2.2	4.4	5	5	5
162	282	0.0	86.3	2.2	4.4	5	5	5
163	148	0.0	86.3	2.2	4.4	5	5	5
164	225	0.0	86.4	2.2	4.4	5	5	5
165	337	0.0	86.4	2.2	4.4	5	5	5
166	152	1.2	87.5	1.9	4.3	5	5	5
167	25	0.7	88.2	1.9	4.3	5	5	5
168	157	0.4	88.6	1.9	4.3	5	5	5
169	18	0.4	89.0	1.9	4.2	5	5	5
170	65	0.3	89.3	1.9	4.2	5	5	5
171	187	0.3	89.6	1.9	4.2	5	5	5
172	189	0.3	89.9	1.9	4.2	5	5	5
173	177	0.2	90.1	1.9	4.2	5	5	5
174	182	0.1	90.2	1.9	4.2	5	5	5
175	284	0.1	90.3	1.9	4.2	5	5	5
176	95	0.1	90.3	1.9	4.2	5	5	5
177	150	0.1	90.4	1.9	4.2	5	5	5
178	359	0.1	90.5	1.9	4.1	5	5	5
179	7	0.0	90.5	1.9	4.1	5	5	5
180	17	0.0	90.5	1.9	4.1	5	5	5
181	56	0.0	90.6	1.9	4.1	5	5	5
182	243	0.0	90.6	1.9	4.1	5	5	5
183	192	0.0	90.7	1.9	4.1	5	5	5
184	380	0.0	90.7	1.9	4.1	5	5	5
185	267	0.0	90.7	1.9	4.1	5	5	5
186	163	0.0	90.7	1.9	4.1	5	5	5
187	263	0.0	90.7	1.9	4.1	5	5	5
188	372	0.0	90.7	1.9	4.1	5	5	5
189	214	0.0	90.8	1.9	4.1	5	5	5
190	115	0.0	90.8	1.9	4.1	5	5	5
191	273	1.7	92.5	1.5	4.0	5	5	5
192	332	1.4	93.9	1.5	3.9	5	5	5
193	178	0.5	94.5	1.5	3.9	5	5	5
194	61	0.4	94.9	1.5	3.8	5	5	5
195	138	0.4	95.2	1.5	3.8	5	5	5
196	53	0.2	95.4	1.5	3.8	5	5	5
197	358	0.2	95.5	1.5	3.8	5	5	5
198	383	0.1	95.7	1.5	3.8	5	5	5
199	135	0.1	95.8	1.5	3.8	5	5	5
200	232	0.1	95.9	1.5	3.8	5	5	5

(Continued)

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Table D3 (Concluded)

Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Level	Down	Terrain	Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Level	Down
201	89	0.1	95.0	1.5	3.8	5	5	5	222	369	0.1	99.3	1.1	3.5	5	5	5
202	226	0.1	95.0	1.5	3.8	5	5	5	223	362	0.1	99.3	1.1	3.5	5	5	5
203	135	0.1	96.1	1.5	3.8	5	5	5	224	270	0.0	99.4	1.1	3.5	5	5	5
204	75	0.1	96.1	1.5	3.8	5	5	5	225	140	0.0	99.4	1.1	3.5	5	5	5
205	123	0.0	96.2	1.5	3.8	5	5	5	226	322	0.0	99.4	1.1	3.5	5	5	5
206	162	0.0	96.2	1.5	3.8	5	5	5	227	224	0.0	99.5	1.1	3.5	5	5	5
207	328	0.0	96.3	1.5	3.8	5	5	5	228	182	0.0	99.5	1.1	3.5	5	5	5
208	261	0.0	96.3	1.5	3.8	5	5	5	229	313	0.0	99.6	1.1	3.5	5	5	5
209	356	0.0	96.3	1.5	3.8	5	5	5	230	167	0.0	99.6	1.1	3.5	5	5	5
210	239	0.0	96.4	1.5	3.7	5	5	5	231	227	0.0	99.6	1.1	3.5	5	5	5
211	347	0.0	96.4	1.5	3.7	5	5	5	232	354	0.0	99.7	1.1	3.5	5	5	5
212	385	0.0	96.4	1.5	3.7	5	5	5	233	257	0.0	99.7	1.1	3.5	5	5	5
213	223	0.8	97.1	1.1	3.7	5	5	5	234	389	0.0	99.7	1.1	3.5	5	5	5
214	125	0.7	97.9	1.1	3.6	5	5	5	235	77	0.0	99.7	1.1	3.5	5	5	5
215	314	0.3	98.2	1.1	3.6	5	5	5	236	393	0.1	99.8	0.1	3.4	2	2	2
216	82	0.3	98.5	1.1	3.6	5	5	5	237	388	0.1	99.9	0.1	3.3	2	2	2
217	125	0.2	98.8	1.1	3.5	5	5	5	238	434	0.0	99.9	0.1	3.3	2	2	2
218	236	0.2	98.9	1.1	3.5	5	5	5	239	392	0.0	99.9	0.1	3.2	2	2	2
219	45	0.1	99.0	1.1	3.5	5	5	5	240	349	0.0	100.0	0.1	3.2	2	2	2
220	353	0.1	99.1	1.1	3.5	5	5	5	241	451	0.0	100.0	0.1	3.2	2	2	2
221	315	0.1	99.2	1.1	3.5	5	5	5	242	395	0.0	100.0	0.1	3.2	2	2	2

Factor Limiting Speed	Percent Distance for 1 to N Units: N= 50	N=100	N=150	N=200	N=242	
						BASIS FOR NO-GO
1	0.0	0.0	0.0	0.0	0.0	SURFACE STRENGTH (MINIMUM) REQUIRED FOR ONE PASS
2	0.0	0.0	0.0	0.0	0.3	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
3	0.0	0.0	0.0	0.0	0.0	OBSTACLE INTERFERENCE
4	0.0	0.0	0.0	0.0	0.0	TRACTION AVAILABLE < SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
						BASIS FOR LIMITING SPEED
5	2.0	15.3	48.0	53.6	55.3	RIDE DYNAMICS
6	0.6	0.5	0.3	0.3	0.2	SURFACE AND SLOPE RESISTANCES
7	1.7	1.4	0.9	0.8	0.7	VISIBILITY
8	0.6	0.7	0.5	0.4	0.4	MANEUVER
9	0.0	0.0	0.0	0.0	0.0	SURFACE, SLOPE, OBSTACLE, AND VEGETATION RESISTANCES
10	94.5	82.1	50.4	44.9	43.1	ACCELERATION AND DECELERATION BETWEEN OBSTACLES

(3 of 3 sheets)

Table D4

West Germany Wet-Season Linear Terrain Predictions

Vehicle	Very High Mobility	River Crossing Time	V_{110}
1. M151A2 1/4-ton, 4x4 truck, utility	103.0	30.1	2.6
2. 1/4-ton, 4x4 truck, utility	113.0	34.2	2.4
3. M151A2 1/4-ton, 4x2 truck, utility	79.0	33.2	1.3
4. 1/4-ton, 4x2 truck, utility	76.0	38.8	0.8
5. M151A2 1/4-ton, 4x2 truck, utility	77.0	41.8	1.2
6. 1/4-ton, 4x4 truck, utility, w/M416	103.0	46.3	2.0
7. M151A2 1/4-ton, 4x2 truck, utility	40.0	44.5	0.4
8. 1/4-ton, 4x2 truck, utility, w/M416	43.0	46.9	0.4
9. M274A2 1/2-ton, 4x4 truck, platform, utility	58.0	70.5	1.5
10. M37B1 3/4-ton, 4x4 truck, cargo	122.0	9.5	3.9
11. M37B1 1-1/4-ton, 4x4 truck, cargo, w/M101	102.0	15.0	3.0
12. M715E1 1-1/4-ton, 4x4 truck, cargo	101.0	10.4	2.7
13. XM705 1-1/4-ton, 4x4 truck, cargo	127.0	8.4	4.0
14. M561 1-1/4-ton, 6x6 truck, cargo	149.0	3.2	5.1
15. 1-1/4-ton, 4x4 truck, utility	92.0	26.8	2.1
16. M715E1 1-1/4-ton, 4x2 truck, cargo	70.0	13.5	1.0
17. 1-1/4-ton, 4x2 truck, utility	68.0	50.8	0.8
18. M715E1 1-1/4-ton, 4x4 truck, cargo, w/M101	94.0	16.0	2.9
19. XM705 1-1/4-ton, 4x4 truck, cargo, w/M101	98.0	13.8	2.8
20. M561 1-1/4-ton, 6x6 truck, cargo, w/M101	117.0	13.8	3.4
21. M561 1-1/4-ton, 6x6 truck, cargo, w/M102	106.0	13.8	3.9
22. 1-1/4-ton, 4x4 truck, cargo, w/M101	67.0	50.6	0.8
23. M715E1 1-1/4-ton, 4x2 truck, cargo, w/M101	60.0	18.4	0.8
24. 1-1/4-ton, 4x2 truck, cargo, w/M101	62.0	53.2	0.7
25. M35A2 2-1/2-ton, 6x6 truck, cargo	100.0	8.1	3.6
26. 2-1/2-ton, 4x2 truck, cargo, (150 in. WB)	39.0	53.3	0.5
27. M35A2 2-1/2-ton, 6x4 truck, cargo	56.0	11.6	1.0

(continued) (1 of 2 sheets)

Table D4 (Concluded)

	Vehicle	Very High Mobility	River Crossing Time	V 110
28.	M35A2 2-1/2-ton, 6x6 truck, cargo, w/M105	55.0	13.5	1.2
29.	M35A2 2-1/2-ton, 6x6 truck, cargo, w/M102	62.0	13.5	1.3
30.	2-1/2-ton, 4x2 truck, cargo, (150 in. WB), w/M105	33.0	38.1	0.3
31.	M35A2 2-1/2-ton, 6x4 truck, cargo, w/M105	45.0	16.9	0.7
32.	M813 5-ton, 6x6 truck, cargo	89.0	7.6	2.9
33.	M656 5-ton, 8x8 truck, cargo	169.0	3.2	5.9
34.	5-ton, 6x4 truck, cargo	45.0	38.1	1.1
35.	M813 5-ton, 6x4 truck, cargo	38.0	11.2	0.3
36.	M813 5-ton, 6x6 truck, cargo, w/M114	38.0	13.0	0.5
37.	M656 5-ton, 8x8 truck, cargo, w/M114	81.0	10.0	1.1
38.	5-ton, 6x4 truck, cargo, w/trailer*	23.0	53.7	0.3
39.	M813 5-ton, 6x4 truck, cargo, w/trailer*	31.0	15.8	0.2
40.	M520E1 8-ton, truck, cargo	47.0	69.7	0.5
41.	M818 5-ton, 6x6 truck, tractor, w/M127	31.0	15.1	0.2
42.	5-ton, 6x4 truck, tractor, (152 in. WB), w/M127	17.0	46.8	0.1
43.	5-ton, 6x4 truck, tractor (150 in. WB), w/M127	28.0	54.0	0.3
44.	M818 5-ton, 6x4 truck, tractor, w/M127	30.0	15.1	0.2
45.	M123A1C 10-ton, 6x6 truck, tractor, w/M127	16.0	15.1	0.2
46.	10-ton, [illegible]x4 truck, tractor, w/M127, (182 in. WB)	14.0	63.5	0.2
47.	XM746 22-1/2-ton, 8x8 truck, tractor, w/M747	28.0	74.7	0.2
48.	22-1/2-ton, 8x4 truck, tractor, w/M747	15.0	70.8	0.1
49.	M113A1 Personnel, Full-tracked, Carrier	149.0	7.2	5.2

* Use M114A1 155mm howitzer

(2 of 2 sheets)

Table D5

West Germany Wet-Season On-Road Speed Predictions for M35A2 2-1/2-Ton, 6x6 Cargo Truck

a. Primary Roads (Type 1)

	Terrain Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
1	1	22.8	22.8	53.8	53.8	3	3	3
2	2	16.9	39.7	58.5	53.8	3	3	3
3	3	9.1	48.8	58.8	58.8	3	3	3
4	12	5.1	53.9	58.0	58.5	3	3	3
5	13	4.4	58.3	53.0	53.8	3	3	3
6	4	3.3	61.6	52.2	58.8	3	3	3
7	21	2.7	64.2	58.8	58.8	3	3	3
8	22	2.4	66.6	53.8	58.4	3	3	3
9	15	1.3	67.9	50.8	53.8	3	3	3
10	24	1.2	69.1	52.8	53.8	3	3	3
11	14	1.1	70.2	53.8	58.8	3	3	3
12	5	2.4	72.6	48.5	49.5	4	4	4
13	16	1.4	74.0	45.0	49.9	4	4	4
14	25	1.0	75.0	48.0	49.9	4	4	4
15	6	0.4	75.4	45.0	49.8	4	4	4
16	26	0.4	75.7	41.0	49.8	4	4	4
17	7	5.6	81.3	34.8	48.2	4	4	4
18	27	0.8	82.2	34.8	48.2	4	4	4
19	17	0.8	83.0	34.8	47.8	4	4	4
20	8	0.9	83.8	29.8	47.5	4	4	4
21	28	0.2	84.1	29.8	47.4	4	4	4
22	18	0.1	84.1	29.0	47.4	4	4	4
23	9	2.6	86.8	24.8	46.8	4	4	4
24	19	1.1	87.9	24.0	45.5	4	4	4
25	29	0.3	88.2	24.0	45.4	4	4	4
26	10	1.5	89.7	19.8	44.3	4	4	4
27	30	5.9	95.6	19.8	43.7	4	4	4
28	20	0.2	95.9	19.8	43.6	4	4	4
29	11	0.8	96.7	13.8	36.2	4	4	4
30	23	1.8	98.5	13.0	36.9	4	4	4
31	31	1.5	100.0	13.0	35.9	4	4	4

Factor Limiting Speed	Percent Distance for 1 to N Units N = 31	
		REASONS FOR NO-GO
1	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	AVAILABLE TRACTION < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEED
3	70.2	RIDE DYNAMICS
4	29.8	ROAD CURVATURE
5	0.0	SURFACE AND SLOPE RESISTANCES

(Continued) (1 of 3 sheets)

Table D5 (Continued)

b. Secondary Roads (Type 2)

TERRAIN UNITS		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
1	32	14.6	14.6	45.2	45.2	5	5	3
2	33	9.3	23.8	45.2	45.2	5	5	3
3	34	4.8	28.7	45.2	45.2	5	5	3
4	43	7.4	36.0	38.4	43.6	5	5	3
5	45	3.3	39.4	38.4	43.1	5	5	3
6	47	2.9	42.2	36.9	42.6	5	4	4
7	54	1.8	44.0	34.8	42.2	5	5	3
8	57	0.9	44.9	33.6	42.0	5	4	4
9	36	3.8	48.8	30.0	40.7	4	4	4
10	65	2.0	50.8	28.3	40.1	5	5	3
11	66	1.1	51.9	28.3	39.7	5	5	3
12	67	1.2	53.1	28.2	39.3	5	5	4
13	59	0.5	53.6	27.1	39.2	5	4	4
14	39	1.3	54.9	26.0	38.7	4	4	4
15	75	0.1	55.1	25.9	38.6	5	5	3
16	76	0.1	55.2	25.8	38.6	5	5	4
17	69	0.5	55.7	25.5	38.4	5	4	4
18	40	2.6	58.2	23.0	37.3	4	4	4
19	51	2.4	60.6	23.8	36.4	4	4	4
20	71	0.5	61.1	21.4	36.2	5	4	4
21	38	3.6	64.7	20.0	34.7	3	3	3
22	35	3.6	68.3	20.8	33.4	3	3	3
23	44	3.5	71.9	20.8	32.3	3	3	3
24	49	2.9	74.8	20.0	31.5	3	3	3
25	46	2.0	76.8	20.0	31.1	3	3	3
26	50	1.6	78.4	20.0	30.7	3	3	3

TERRAIN UNITS		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	LEVEL	DOWN
27	48	1.4	79.8	28.0	30.4	3	3	3
28	37	1.0	80.8	28.0	30.3	3	3	3
29	56	0.9	81.7	28.0	30.1	3	3	3
30	61	0.5	82.2	28.9	30.0	5	3	3
31	55	0.5	82.7	28.0	29.9	3	3	3
32	58	1.2	83.8	28.5	29.6	3	3	3
33	60	0.1	83.1	25.0	29.6	3	3	3
34	41	2.8	85.9	19.0	29.3	4	4	4
35	52	1.4	87.3	19.0	29.0	4	4	4
36	62	0.6	87.9	19.0	28.9	4	4	4
37	78	0.5	88.4	18.3	28.8	5	3	3
38	64	0.5	88.9	18.3	28.7	5	3	3
39	68	0.4	89.3	18.3	28.7	5	3	3
40	72	0.1	89.4	18.3	28.7	5	3	3
41	73	0.5	89.8	17.8	28.6	5	4	4
42	81	0.1	89.9	17.6	28.5	5	5	3
43	78	0.1	90.0	17.3	28.5	5	5	3
44	77	0.1	90.1	17.3	28.5	5	3	3
45	79	0.2	90.3	13.8	28.4	5	3	3
46	80	0.1	90.5	13.8	28.4	5	3	3
47	42	5.4	95.9	13.0	26.6	4	4	4
48	53	2.8	98.7	13.8	25.8	4	4	4
49	63	0.7	99.4	13.0	25.7	4	4	4
50	74	0.4	99.8	13.5	25.6	4	4	4
51	82	0.1	99.8	12.9	25.5	5	4	4
52	83	0.1	100.0	10.6	25.5	5	4	4

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N = 50	N = 52	
			REASONS FOR NO-GO
1	0.0	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	0.0	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
			REASONS FOR LIMITING SPEED
3	38.3	38.3	RIDE DYNAMICS
4	28.4	28.5	ROAD CURVATURE
5	33.2	33.2	SURFACE AND SLOPE RESISTANCES

(Continued)

(2 of 3 sheets)

Table D5(Concluded)

c. Trail Roads (Type 3)

	TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
1	95	0.0	0.0	30.4	30.4	5	5	4
2	114	0.6	0.8	28.2	28.3	5	5	4
3	88	3.4	4.2	27.0	27.2	5	5	5
4	90	2.5	6.6	27.0	27.2	5	5	5
5	116	2.0	8.7	27.0	27.1	5	4	4
6	101	8.9	17.5	26.6	26.9	5	4	4
7	109	4.0	21.5	24.2	26.3	5	4	4
8	124	0.6	22.1	21.0	26.1	5	4	4
9	89	3.3	25.4	20.0	25.1	3	3	3
10	97	1.9	27.4	20.0	24.7	3	3	3
11	93	0.5	27.9	20.0	24.6	3	3	3
12	107	2.1	29.9	19.3	24.1	5	3	3
13	104	0.1	30.0	19.3	24.1	5	3	3
14	102	1.4	31.4	19.0	23.8	4	4	4
15	118	3.2	34.7	18.3	23.2	5	3	3
16	112	1.3	36.0	18.3	22.9	5	3	3
17	115	0.6	36.6	18.3	22.9	5	3	3
18	122	0.2	36.8	17.2	22.8	5	3	3
19	120	5.5	42.3	10.0	19.5	4	4	4
20	125	0.7	43.1	10.0	19.2	4	4	4
21	130	0.8	43.9	9.4	18.8	5	4	4
22	103	11.5	55.4	7.7	14.5	3	3	3
23	92	4.1	59.5	7.7	13.7	3	3	3
24	117	3.0	62.6	7.7	13.2	3	3	3
25	84	2.2	64.8	7.7	12.9	3	3	3
26	91	1.7	66.5	7.7	12.6	3	3	3
27	98	1.5	68.0	7.7	12.5	3	3	3
28	87	1.2	69.3	7.7	12.3	3	3	3
29	128	1.1	70.4	7.7	12.2	3	3	3
30	105	0.7	71.0	7.7	12.1	3	3	3
31	119	0.4	71.5	7.7	12.1	3	3	3
32	106	0.3	71.8	7.7	12.1	3	3	3
33	86	0.3	72.1	7.7	12.0	3	3	3
34	131	0.2	72.3	7.7	12.0	3	3	3
35	113	0.2	72.5	7.7	12.0	3	3	3
36	126	0.1	72.6	7.7	12.0	3	3	3
37	129	0.1	72.7	7.7	12.0	3	3	3
38	133	0.2	72.9	6.0	12.0	5	3	3
39	100	10.6	83.4	3.0	8.7	3	3	3
40	99	6.9	90.3	3.0	7.6	3	3	3
41	111	4.8	95.1	3.0	7.0	3	3	3
42	108	1.7	96.8	3.0	6.9	3	3	3
43	94	0.9	97.8	3.0	6.8	3	3	3
44	127	0.5	98.2	3.0	6.7	3	3	3
45	110	0.5	98.7	3.0	6.7	3	3	3
46	123	0.5	99.2	3.0	6.7	3	3	3
47	85	0.4	99.6	3.0	6.6	3	3	3
48	132	0.2	99.8	3.0	6.6	3	3	3
49	96	0.1	99.9	3.0	6.6	3	3	3
50	121	0.1	100.0	3.0	6.6	3	3	3

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N = 50	REASONS FOR NO-GO
1	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEEDS
3	66.8	RIDE DYNAMICS
4	16.8	ROAD CURVATURE
5	[illegible]	SURFACE AND SLOPE RESISTANCES

(3 of 3 sheets)

Table D6

Thailand Wet-Season On-Road Speed Predictions for M35A2 2-1/2-Ton, 6x6 Cargo Truck

a. Primary Roads (Type 1)

	Terrain Units	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
1	1	89.7	89.7	50.0	50.0	3	3	3
2	3	3.1	92.8	50.0	50.0	3	3	3
3	2	2.8	95.5	50.0	50.0	3	3	3
4	4	1.5	97.1	50.0	50.0	3	3	3
5	11	0.7	97.8	50.0	50.0	3	3	3
6	10	0.3	98.0	50.0	50.0	3	3	3
7	5	0.2	98.2	48.0	50.0	4	4	4
8	6	0.5	98.8	41.0	49.9	4	4	4
9	7	0.4	99.1	29.0	49.8	4	4	4
10	8	0.2	99.3	24.0	49.7	4	4	4
11	9	0.7	100.0	13.0	48.7	4	4	4

Factor Limiting Speed	Percent Distance 1 to N Units N = 11	Reasons for No-Go
1	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEED
3	98.0	RIDE DYNAMICS
4	2.0	ROAD CURVATURE
5	0.0	SLOPE AND SURFACE RESISTANCES

(Continued) (1 of 3 sheets)

Table D6 (Continued)

b. Secondary Roads (Type 2)

	Terrain Units#	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
1	12	38.9	38.9	45.2	45.2	5	5	3
2	19	0.7	39.6	30.0	44.8	4	4	4
3	20	0.3	39.9	26.0	44.5	4	4	4
4	21	0.8	40.7	23.0	43.7	4	4	4
5	13	38.9	79.6	20.0	27.7	3	3	3
6	14	5.7	85.2	20.0	27.0	3	3	3
7	15	3.4	88.7	20.0	26.6	3	3	3
8	17	3.3	92.0	20.0	26.3	3	3	3
9	16	3.1	95.1	20.0	26.1	3	3	3
10	18	1.6	96.7	20.0	25.9	3	3	3
11	23	0.5	97.1	20.0	25.9	3	3	3
12	22	2.7	99.8	13.0	25.2	4	4	4
13	24	0.2	100.0	13.0	25.2	4	4	4

Factor Limiting Speed	Percent Distance for 1 to N Units N = 13	
		Reasons for No-Go
1	0.0	Surface strength < minimum required for one pass
2	0.0	Available traction ≤ surface and slope resistance
		Reasons for Limiting Speed
3	69.4	Ride dynamics
4	4.7	Road curvature
5	25.9	Surface and slope resistances

(Continued)

(2 of 3 sheets)

Table D 6 (Concluded)

c. Trail Roads (Type 3)

	Terrain Unit #	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
1	39	0.1	0.1	28.9	28.9	5	5	4
2	32	4.8	5.0	27.0	27.0	5	5	5
3	25	14.0	19.0	20.0	21.5	3	3	3
4	33	3.6	22.6	20.0	21.2	3	3	3
5	37	0.1	22.8	20.0	21.2	3	3	3
6	41	0.0	22.8	19.3	21.2	5	3	3
7	34	9.3	32.1	19.0	20.5	4	4	4
8	30	14.1	46.2	7.7	13.6	3	3	3
9	26	14.0	60.2	7.7	11.5	3	3	3

	Terrain Unit #	% Distance In Unit	% Distance Accum	Predicted Speed In Unit	Predicted Speed Accum	Factor Limiting Speed Up	Factor Limiting Speed Level	Factor Limiting Speed Down
10	27	11.8	72.0	7.7	10.7	3	3	3
11	36	7.8	79.8	7.7	10.3	3	3	3
12	19	4.8	84.6	7.7	10.1	3	3	3
13	15	1.8	86.4	7.7	10.0	3	3	3
14	31	1.7	88.1	7.7	10.0	3	3	3
15	42	0.0	88.1	7.7	10.0	3	3	3
16	28	11.6	99.7	3.0	7.9	3	3	3
17	38	0.2	100.0	3.0	7.8	3	3	3
18	40	0.0	100.0	3.0	7.8	3	3	3

Factor Limiting Speed	Percent Distance for 1 to N Units N = 18	
		Reasons for No-Go
1	0.0	Surface strength < minimum required for one pass
2	0.0	Traction available < surface and slope resistances
		Reasons for Limiting Speed
3	85.7	Ride dynamics
4	9.4	Road curvature
5	5.0	Surface and slope resistances

(3 of 3 sheets)

Table D7

Arizona Wet-Season On-Road Speed Predictions for M35A2 2-12/-Tcn, 6x6 Cargo Truck

a. Primary Roads (Type 1)

	TERRAIN UNIT#	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
1	1	69.7	69.7	50.0	50.0	3	3	3
2	2	10.3	80.1	50.0	50.0	3	3	3
3	3	4.2	84.3	50.0	50.0	3	3	3
4	4	3.9	88.2	50.0	50.0	3	3	3
5	11	1.6	89.8	50.0	50.0	3	3	3
6	12	0.2	90.0	50.0	50.0	3	3	3
7	13	0.1	90.2	50.0	50.0	3	3	3
8	5	1.8	92.0	48.0	50.0	4	4	4
9	6	1.3	93.3	45.0	49.8	4	4	4
10	7	0.2	93.5	34.0	49.8	4	4	4
11	8	0.1	93.7	29.0	49.7	4	4	4
12	9	0.7	94.4	19.0	49.1	4	4	4
13	10	5.6	100.0	13.0	42.5	4	4	4

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N = 13	
		REASONS FOR NO-GO
1	[illegible]	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	[illegible]	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEED
3	90.2	RIDE DYNAMICS
4	9.8	ROAD CURVATURE
5	0.0	SURFACE AND SLOPE RESISTANCES

(Continued) (1 of 3 sheets)

TableD7 (Continued)

b. Secondary Roads (Type 2)

	TERRAIN UNITS	% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
1	14	35.0	35.0	45.2	45.2	5	5	3
2	26	0.9	36.0	38.4	45.0	5	5	3
3	28	0.3	36.3	38.2	44.9	5	5	4
4	21	1.4	37.6	30.0	44.1	4	4	4
5	22	0.9	38.5	26.0	43.5	4	4	4
6	30	0.2	38.7	21.4	43.2	3	4	4
7	13	35.0	73.7	20.0	27.8	3	3	3
8	16	9.4	83.2	22.0	26.7	3	3	3
9	17	4.3	87.5	20.0	26.2	3	3	3
10	19	2.7	90.2	20.0	26.0	3	3	3
11	25	1.1	91.3	20.0	25.9	3	3	3
12	18	0.9	92.1	20.0	25.8	3	3	3
13	27	0.5	92.6	20.0	25.8	3	3	3
14	29	0.4	[illegible]	20.0	25.8	3	3	3
15	28	0.4	93.4	20.0	25.7	3	3	3
16	23	0.5	93.	19.0	25.7	4	4	4
17	24	6.1	100.0	13.0	24.2	4	4	4

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N = 17	
		REASONS FOR NO-GO
1	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEED
3	66.7	RIDE DYNAMICS
4	9.0	ROAD CURVATURE
5	24.2	SURFACE AND SLOPE RESISTANCES

(Continued)

(2 of 3 sheets)

Table D7 (Concluded)

c. Trail Roads (Type 3)

TERRAIN UNIT#		% DISTANCE IN UNIT	% DISTANCE ACCUM	PREDICTED SPEED IN UNIT	PREDICTED SPEED ACCUM	FACTOR LIMITING SPEED UP	FACTOR LIMITING SPEED LEVEL	FACTOR LIMITING SPEED DOWN
1	45	0.3	0.3	37.3	37.3	5	5	4
2	38	3.0	3.4	29.0	29.6	4	4	4
3	31	23.9	27.3	20.0	20.8	3	3	3
4	39	2.7	30.0	20.0	20.8	3	3	3
5	43	1.0	31.0	20.0	20.7	3	3	3
6	47	0.5	31.6	20.0	20.7	3	3	3
7	52	0.1	31.7	20.0	20.7	3	3	3
8	54	0.1	31.8	20.0	20.7	3	3	3
9	40	1.1	32.9	19.0	20.6	4	4	4
10	59	0.2	33.0	18.7	20.6	5	5	4
11	57	0.1	33.1	18.3	20.6	5	3	3
12	51	0.4	33.5	16.8	20.4	4	4	4
13	32	23.9	57.4	7.7	12.1	3	3	3
14	33	11.7	69.1	7.7	11.8	3	3	3
15	42	6.7	75.8	7.7	10.6	3	3	3
16	36	4.5	80.3	7.7	10.4	3	3	3
17	35	3.6	83.9	7.7	10.2	3	3	3
18	37	1.4	85.3	7.7	10.2	3	3	3
19	41	1.2	86.5	7.7	10.1	3	3	3
20	53	0.2	86.7	7.7	10.1	3	3	3
21	48	0.2	86.9	7.7	10.1	3	3	3
22	55	0.2	87.0	7.7	10.1	3	3	3
23	56	0.1	87.1	7.7	10.1	3	3	3
24	34	9.4	96.5	3.8	8.2	3	3	3
25	44	1.4	97.9	3.8	8.0	3	3	3
26	49	0.8	98.6	3.8	7.9	3	3	3
27	46	0.6	99.3	3.8	7.8	3	3	3
28	50	0.6	99.9	3.8	7.8	3	3	3
29	58	0.1	100.0	3.8	7.7	3	3	3
30	62	0.0	100.0	3.8	7.7	3	3	3

FACTOR LIMITING SPEED	PERCENT DISTANCE FOR 1 TO N UNITS N = 30	
		REASONS FOR NO-GO
1	0.0	SURFACE STRENGTH < MINIMUM REQUIRED FOR ONE PASS
2	0.0	TRACTION AVAILABLE < SURFACE AND SLOPE RESISTANCES
		REASONS FOR LIMITING SPEED
3	95.0	RIDE DYNAMICS
4	4.7	ROAD CURVATURE
5	0.3	SURFACE AND SLOPE RESISTANCES

(3 of 3 sheets)

APPENDIX E: OFF-ROAD MOBILITY PROFILES FOR AREAL TERRAIN

This appendix presents the off-road mobility profiles for the vehicles used in this study (figs. E1 - E54). Each figure presents profiles for a single vehicle for the three study traverses. The figures are presented in the same order as the vehicles are listed in table 9. In each case, the vehicle number follows the figure number.

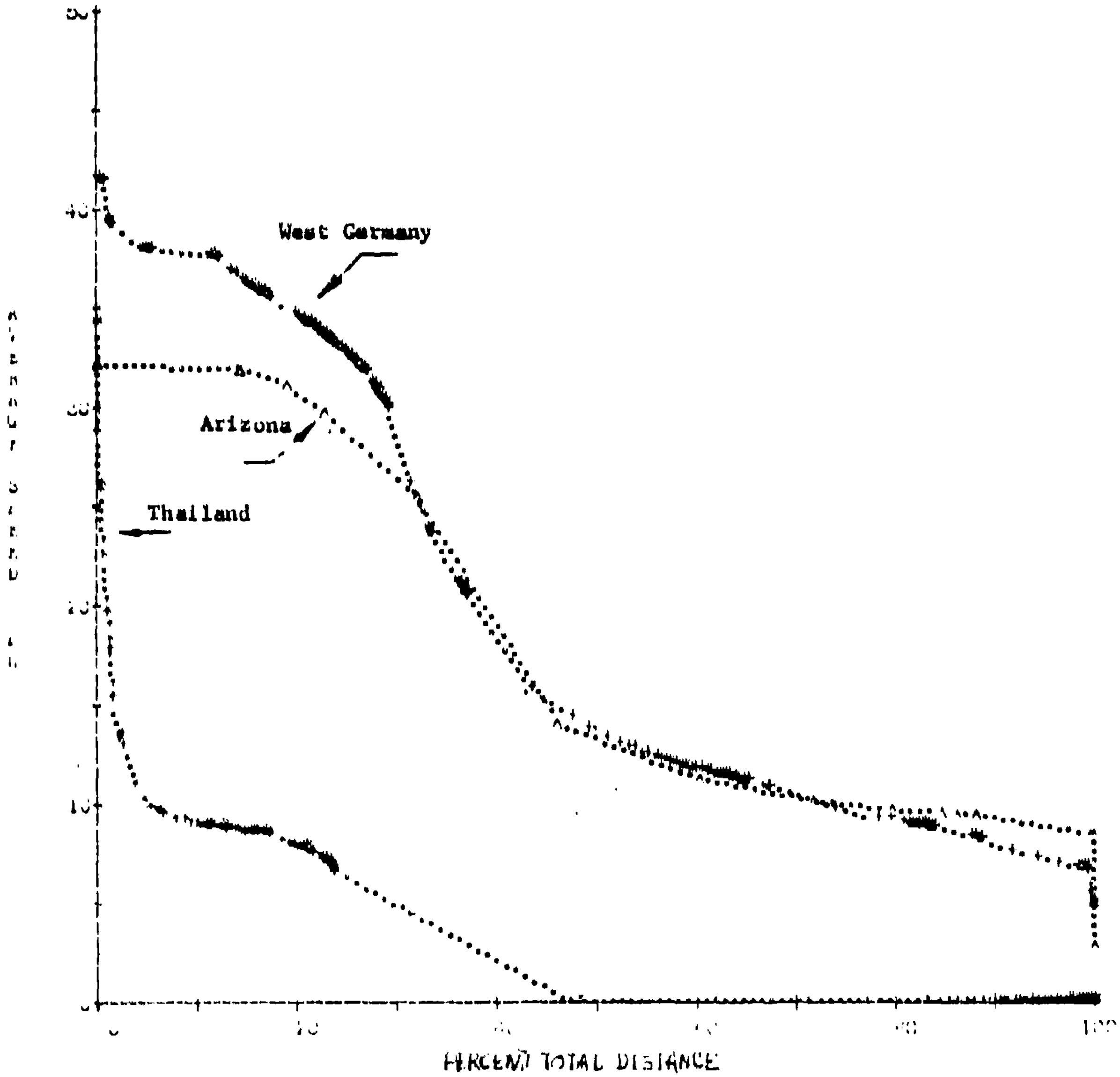


Fig. E1. (1) Off-road mobility profile, M151A2 1/4-ton, 4x4 truck, utility

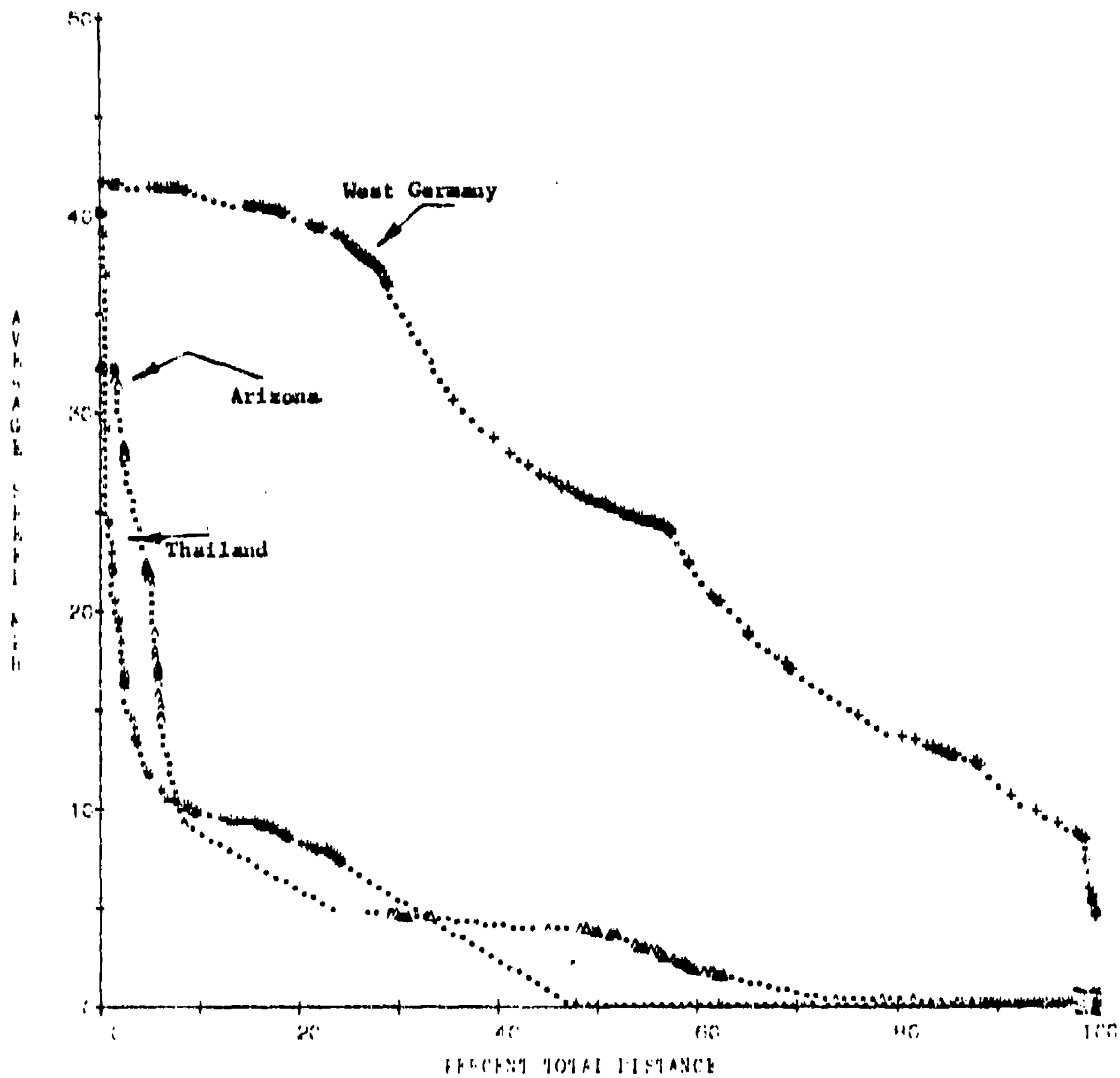


Fig. E2. (2) Off-road mobility profile, 1/4-ton, 4x4 truck, utility

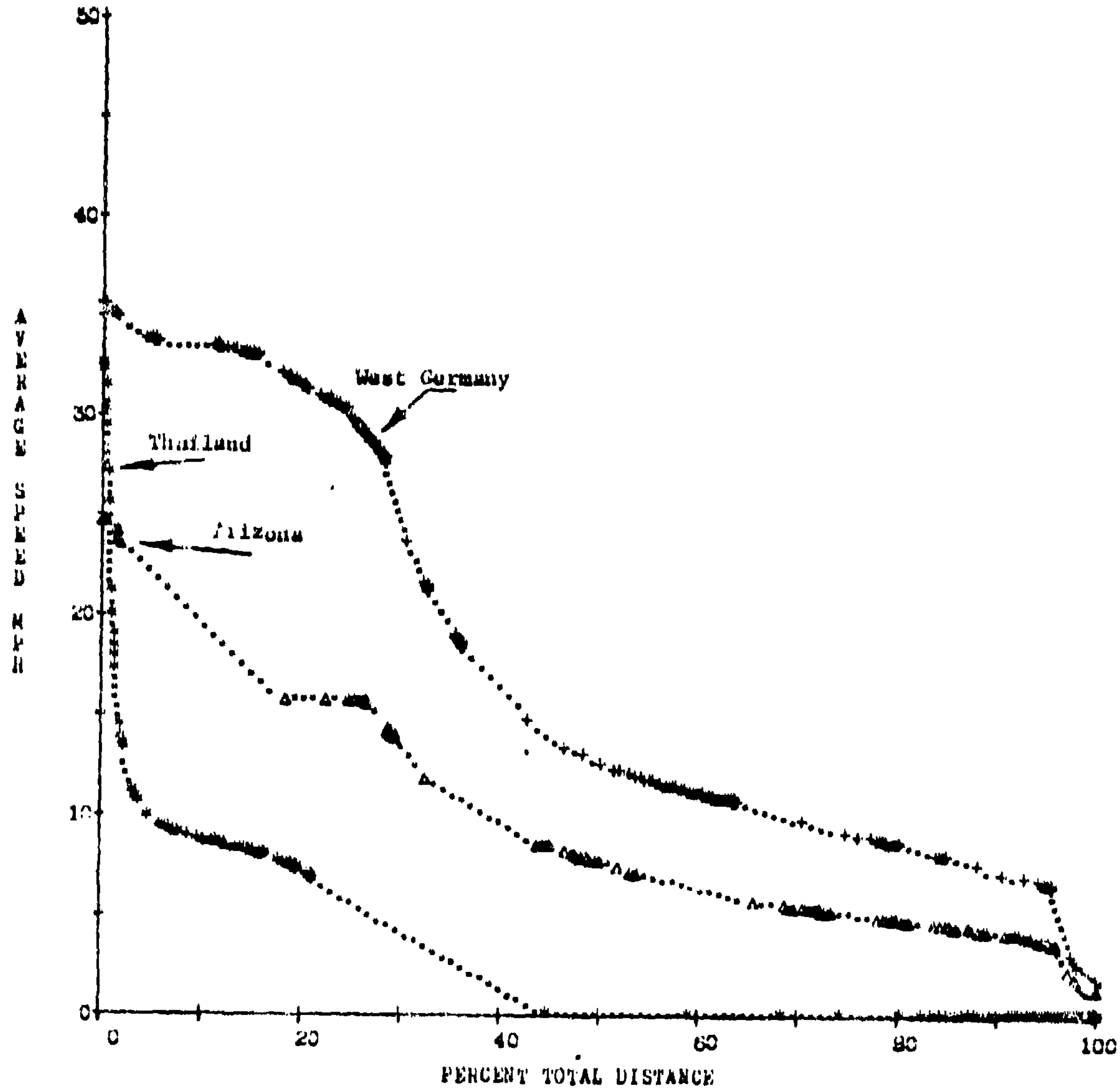


Fig. E3. (3) Off-road mobility profile, M151A2 1/4-ton, 4x2 truck, utility

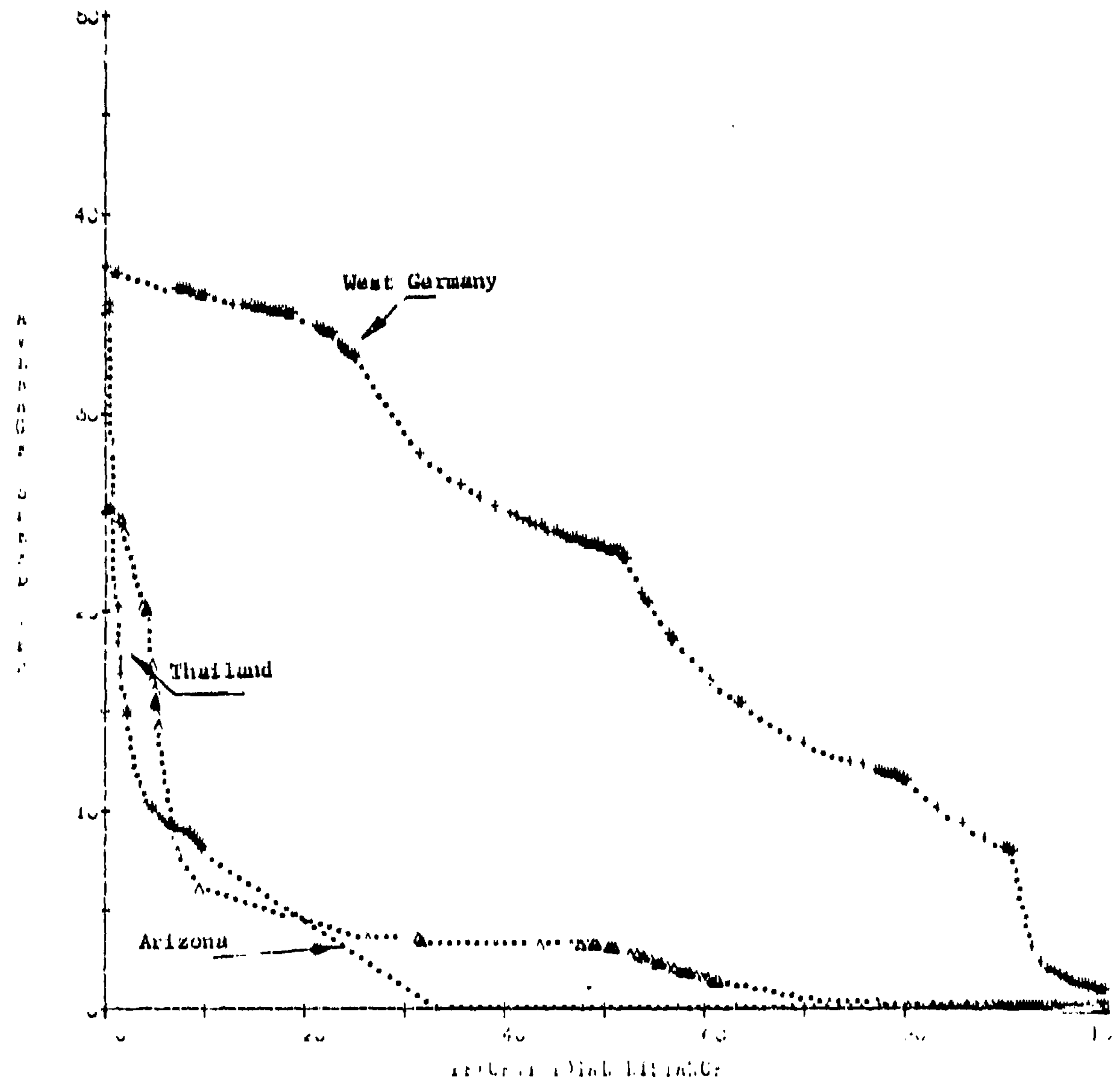


Fig. E4. (4) Off-road mobility profile, 1/4-ton, 4x2 truck, utility

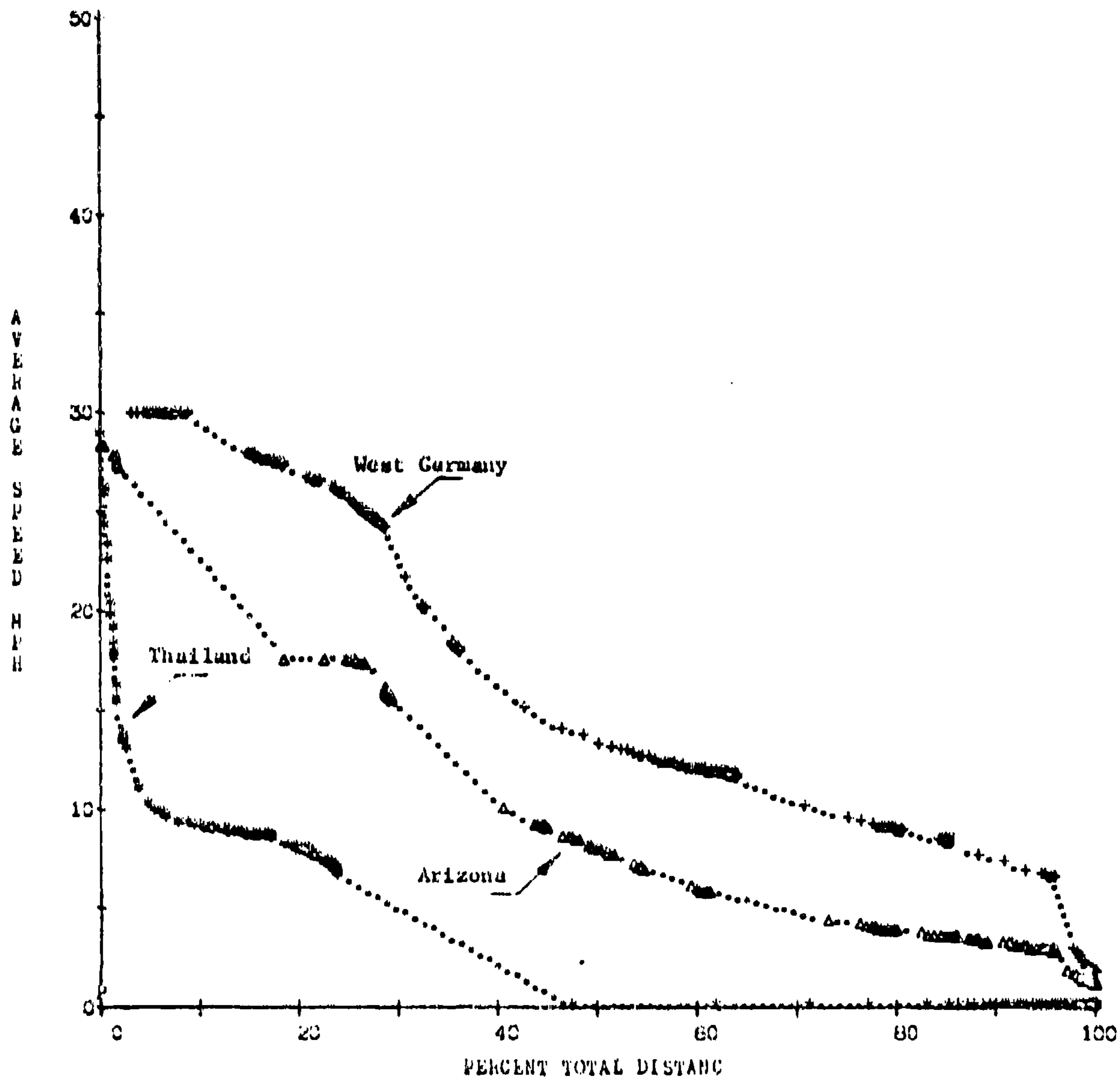


Fig. E5. (5) Off-road mobility profile, M151A2 1/4-ton, 4x4 truck, utility with M416 trailer

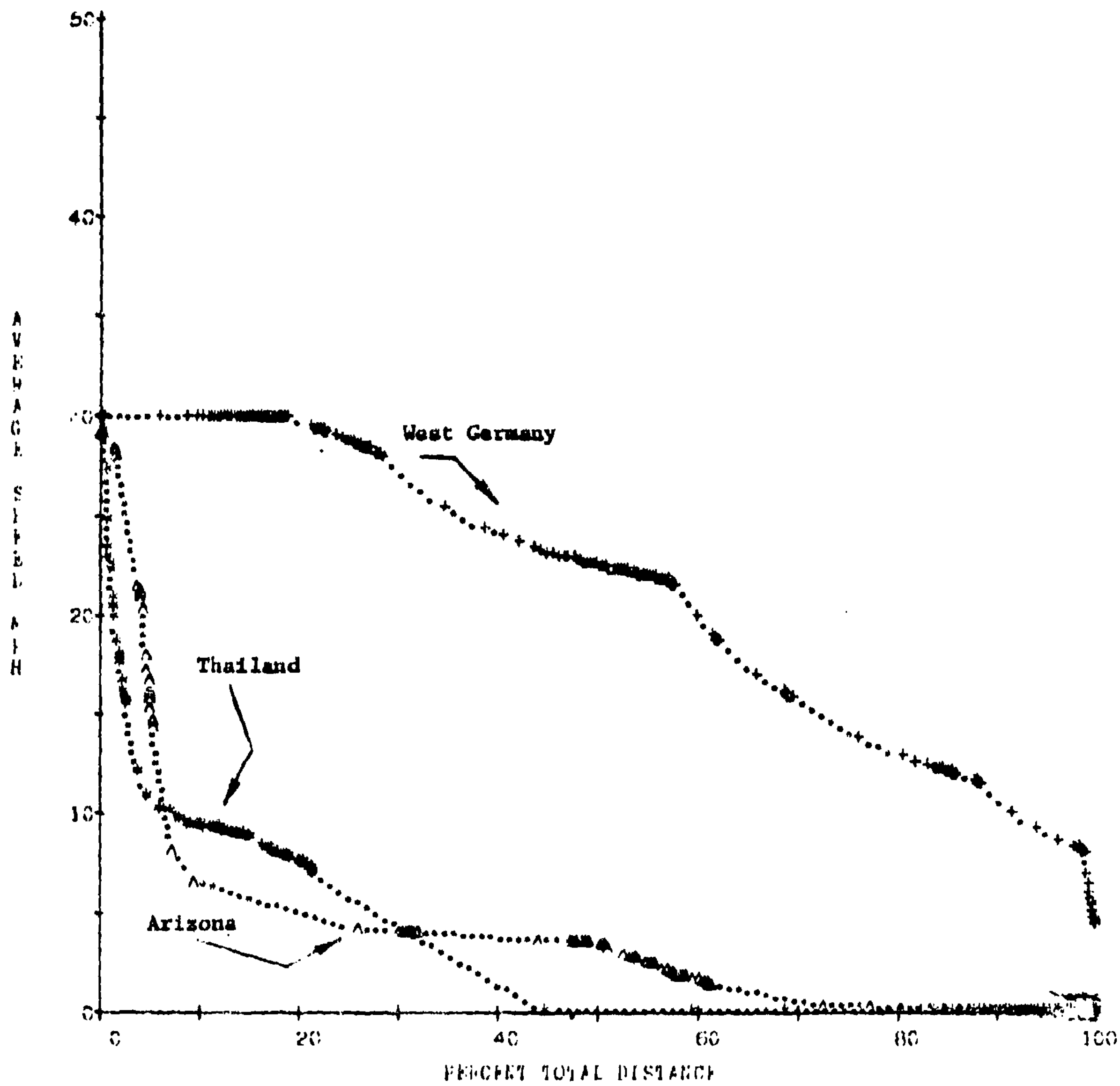


Fig. E6. (6) Off-road mobility profile, 1/4-ton, 4x4 truck, utility with M416 trailer

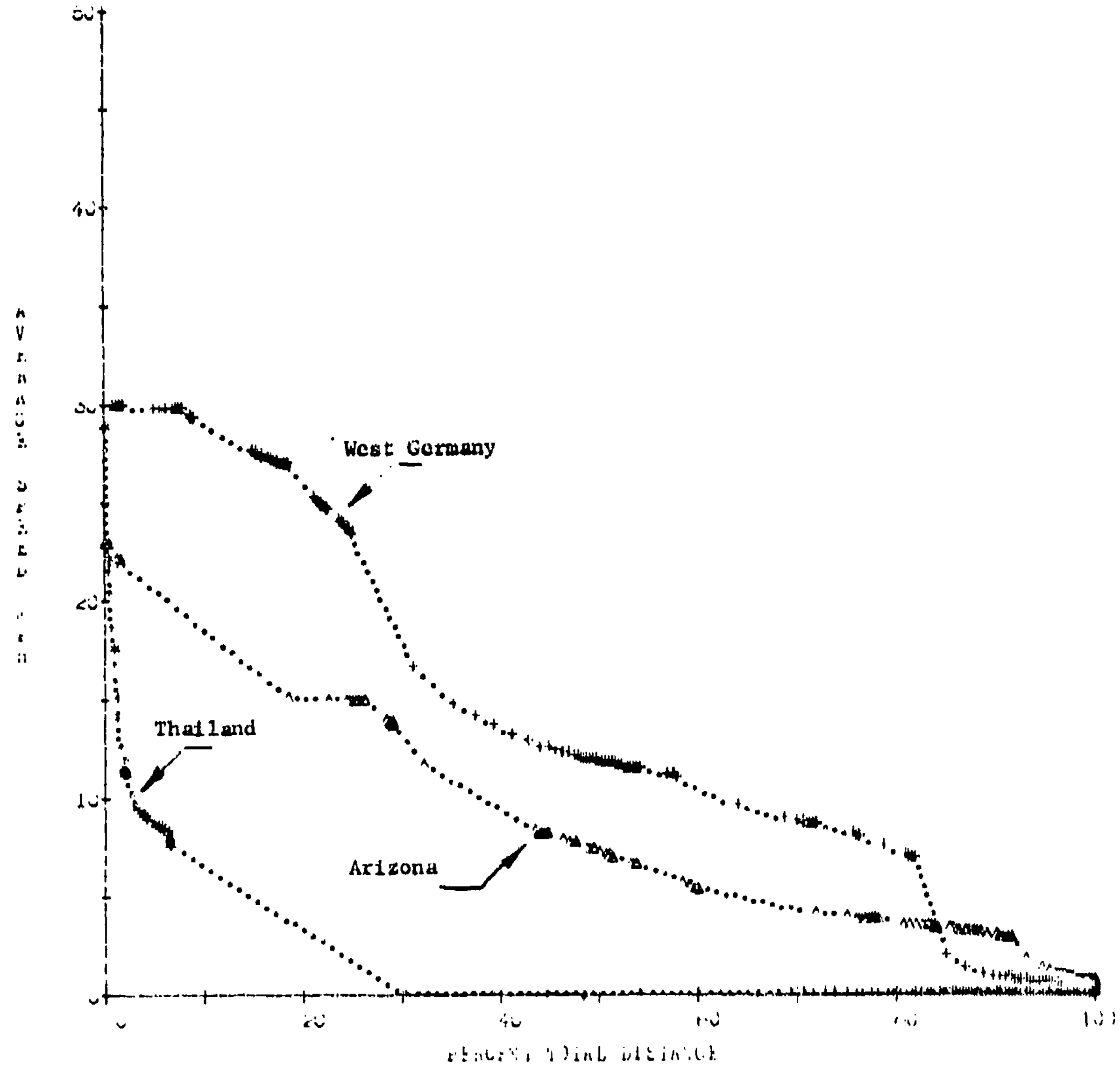


Fig. E7. (7) Off-road mobility profile, M151A2 1/4-ton, 4x2 truck, utility with M416 trailer

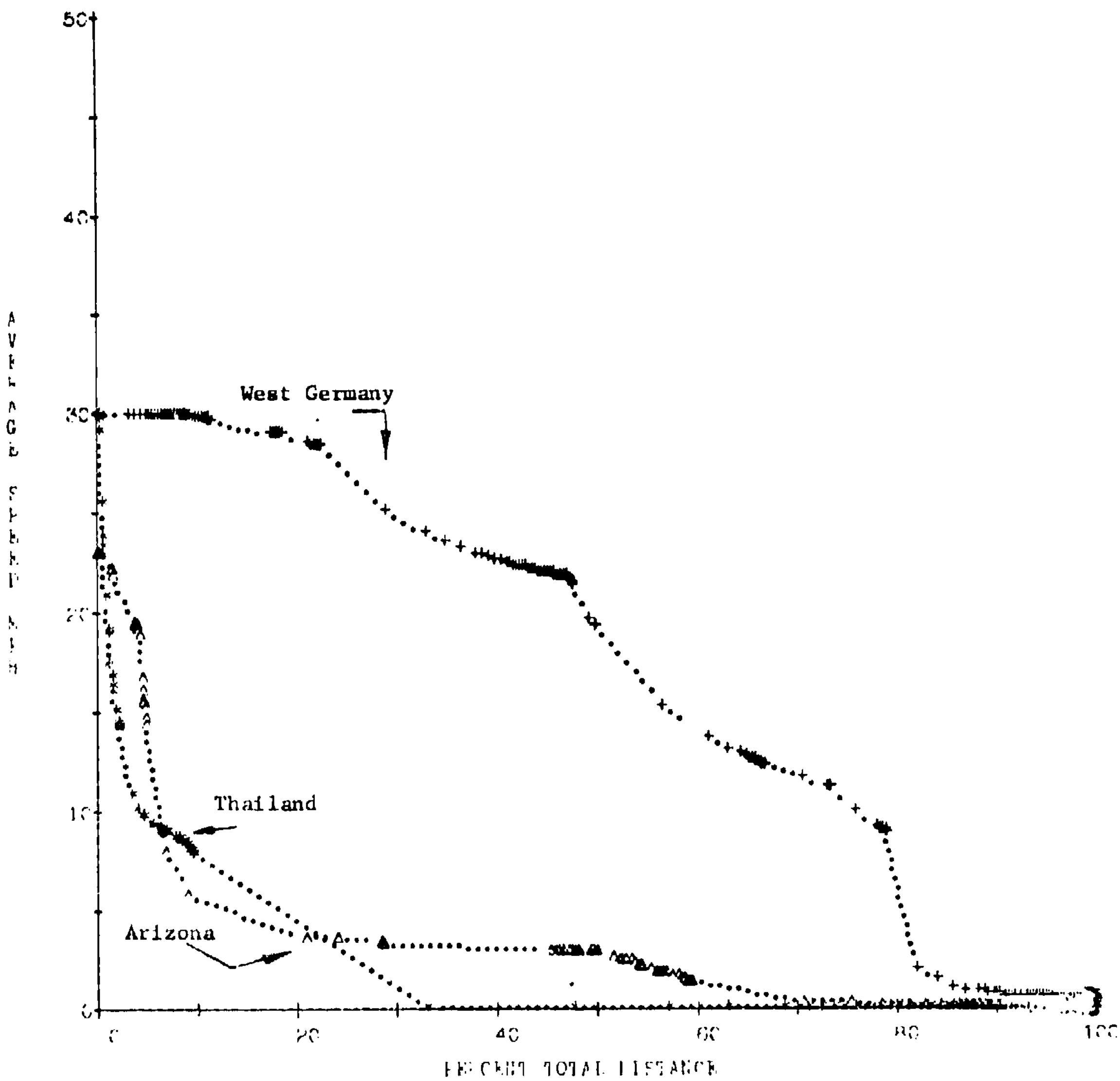


Fig. E8. (8) Off-road mobility profile, 1/4-ton, 4x2 truck, utility with M416 trailer

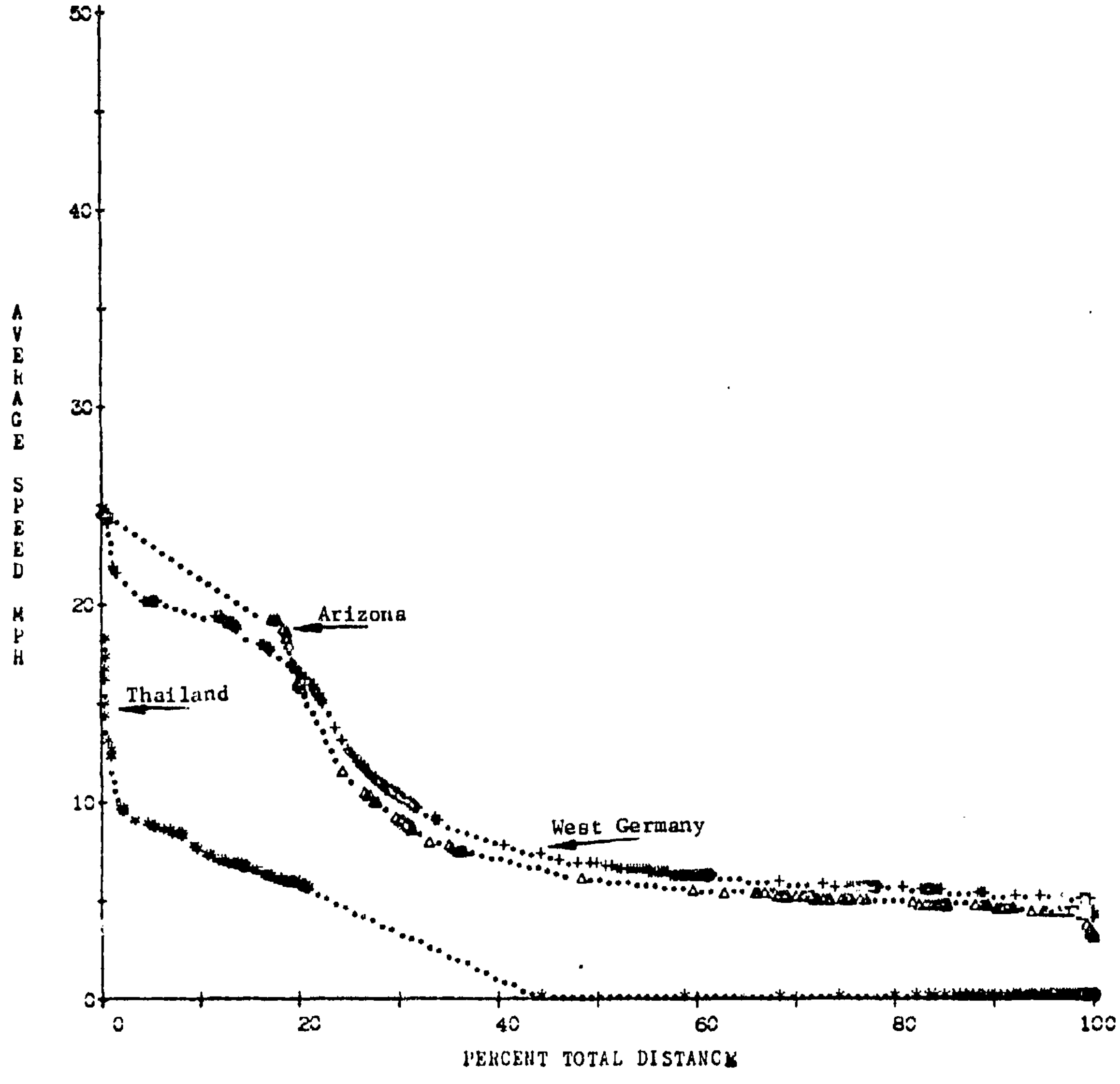


Fig. E9. (9) Off-road mobility profile, M274A2 1/2-ton, 4x4 truck, platform, utility

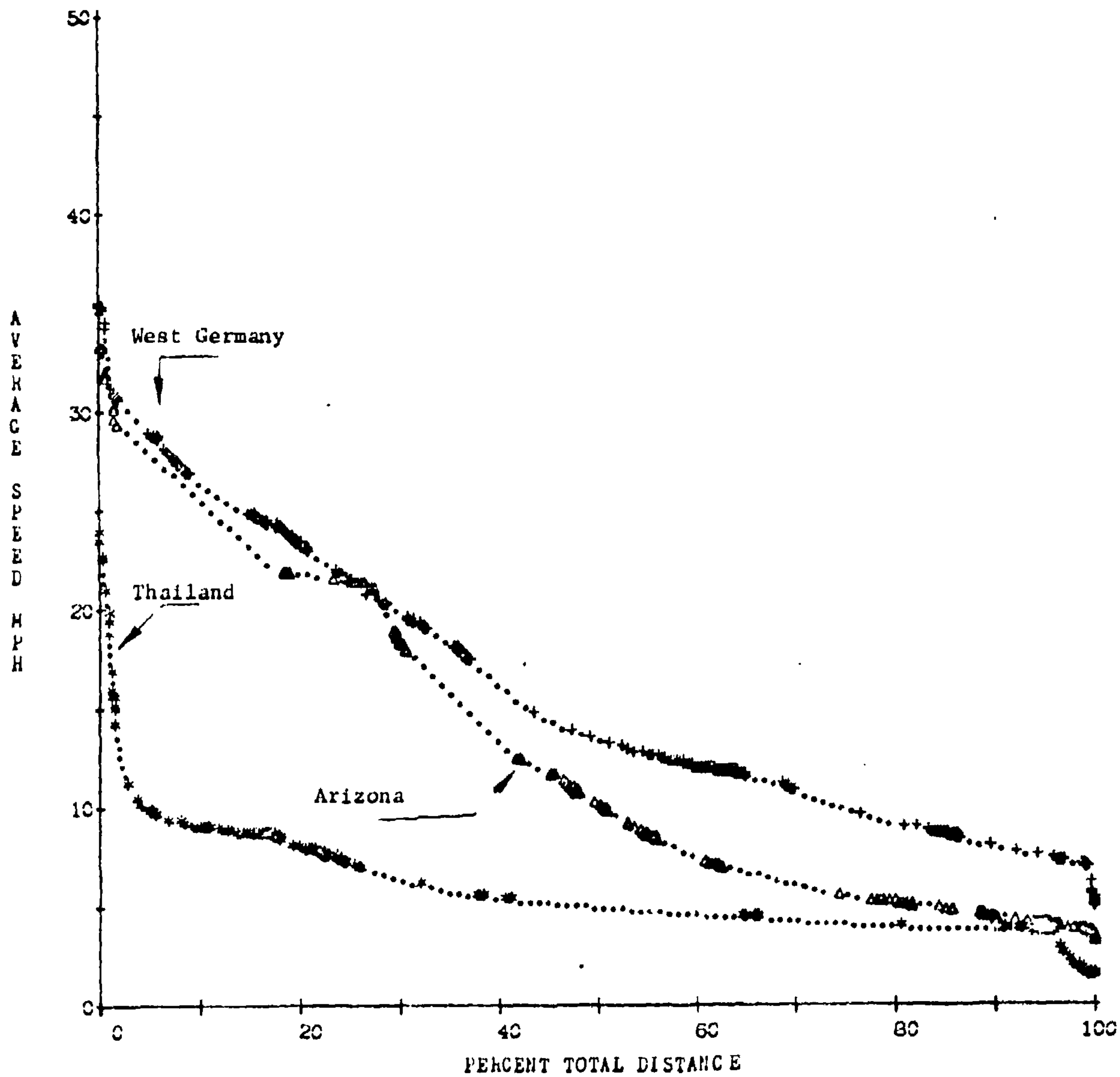


Fig. E10. (10) Off-road mobility profile, M37B1 3/4-ton, 4x4 truck, cargo with M101A1 trailer

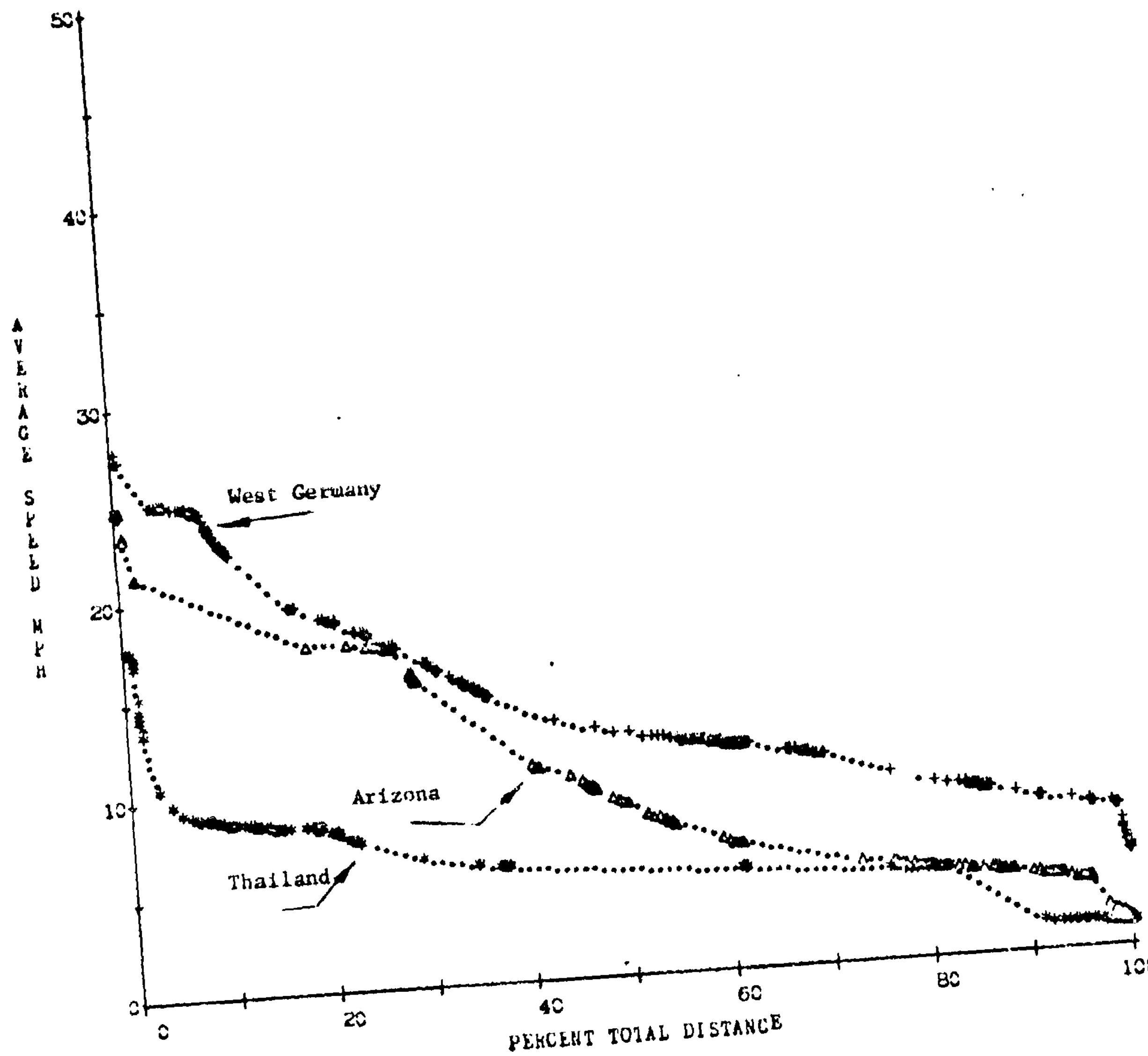


Fig. E11.(11) Off-road mobility profile, M37B1 3/4-ton, 4x4 truck,cargo with M101A1, trailer, cargo

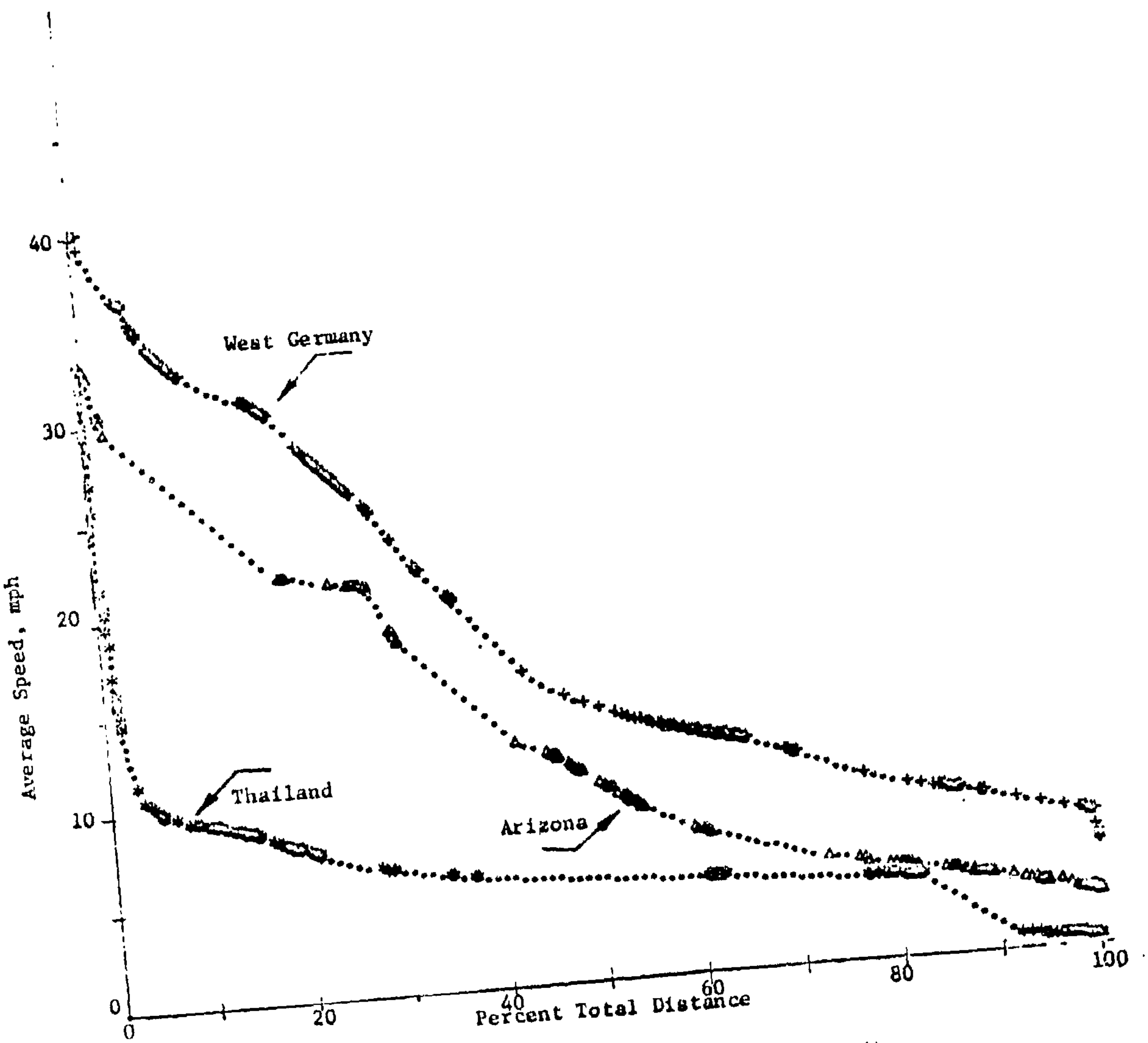


Fig. E12. (12) Off-road mobility profile, M715E1 1-1/4-ton, 4x4 truck, cargo

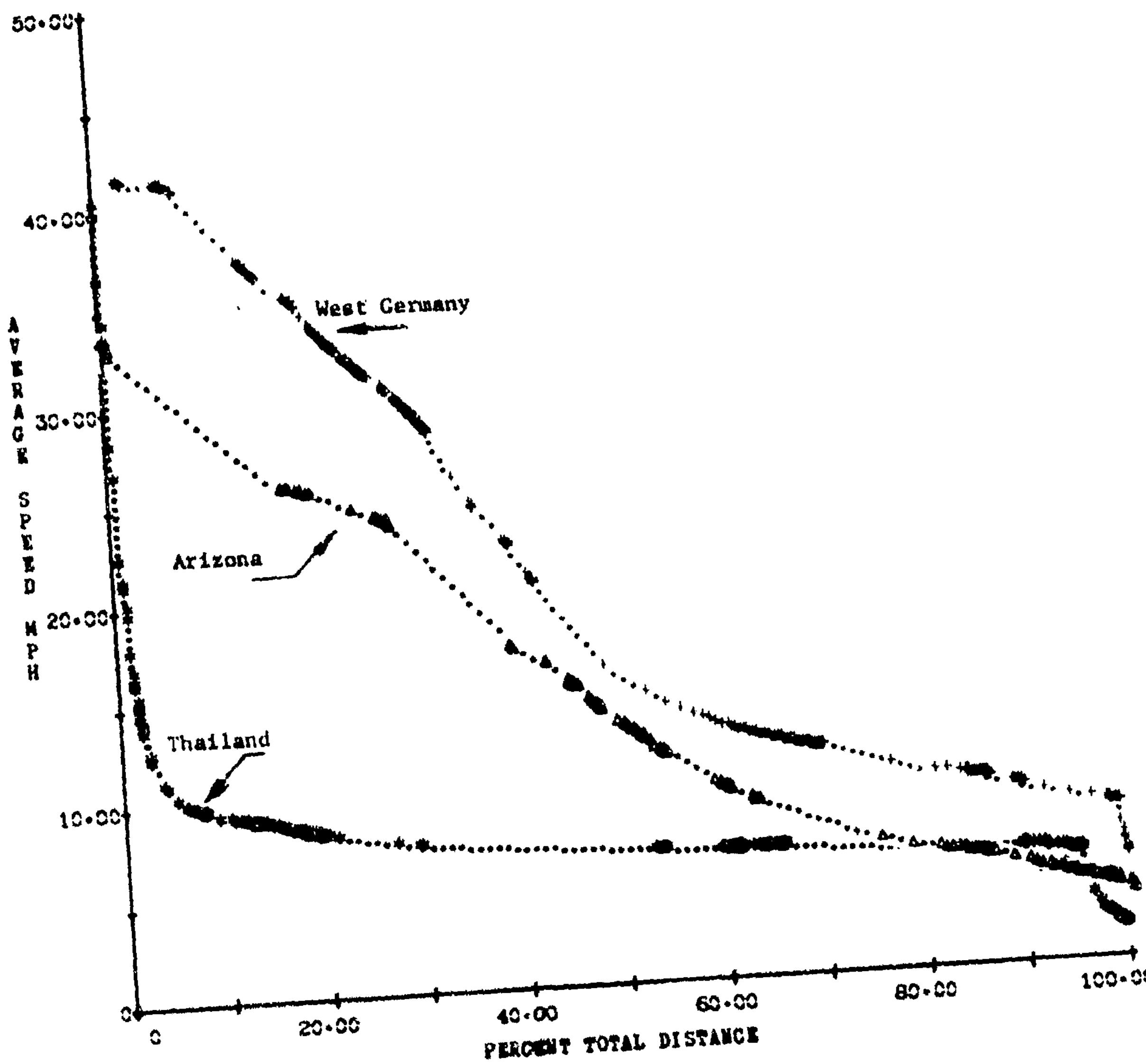


Fig. E13. (13) Off-road mobility profile, XM705 1-1/4-ton, 4x4 truck, cargo

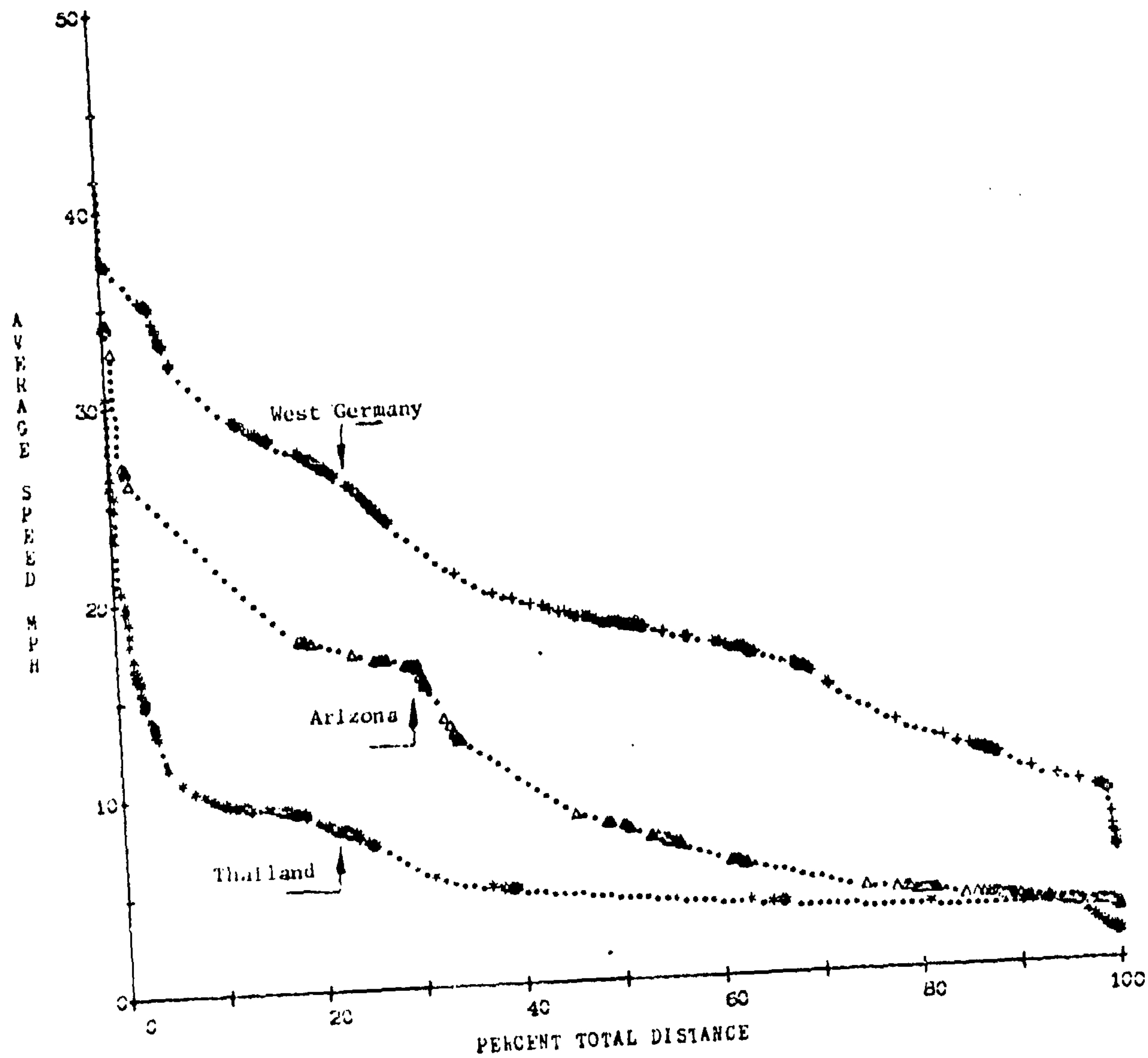


Fig. E14. (14) Off-road mobility profile, M561 1-1/4-ton, 6x6 truck, cargo

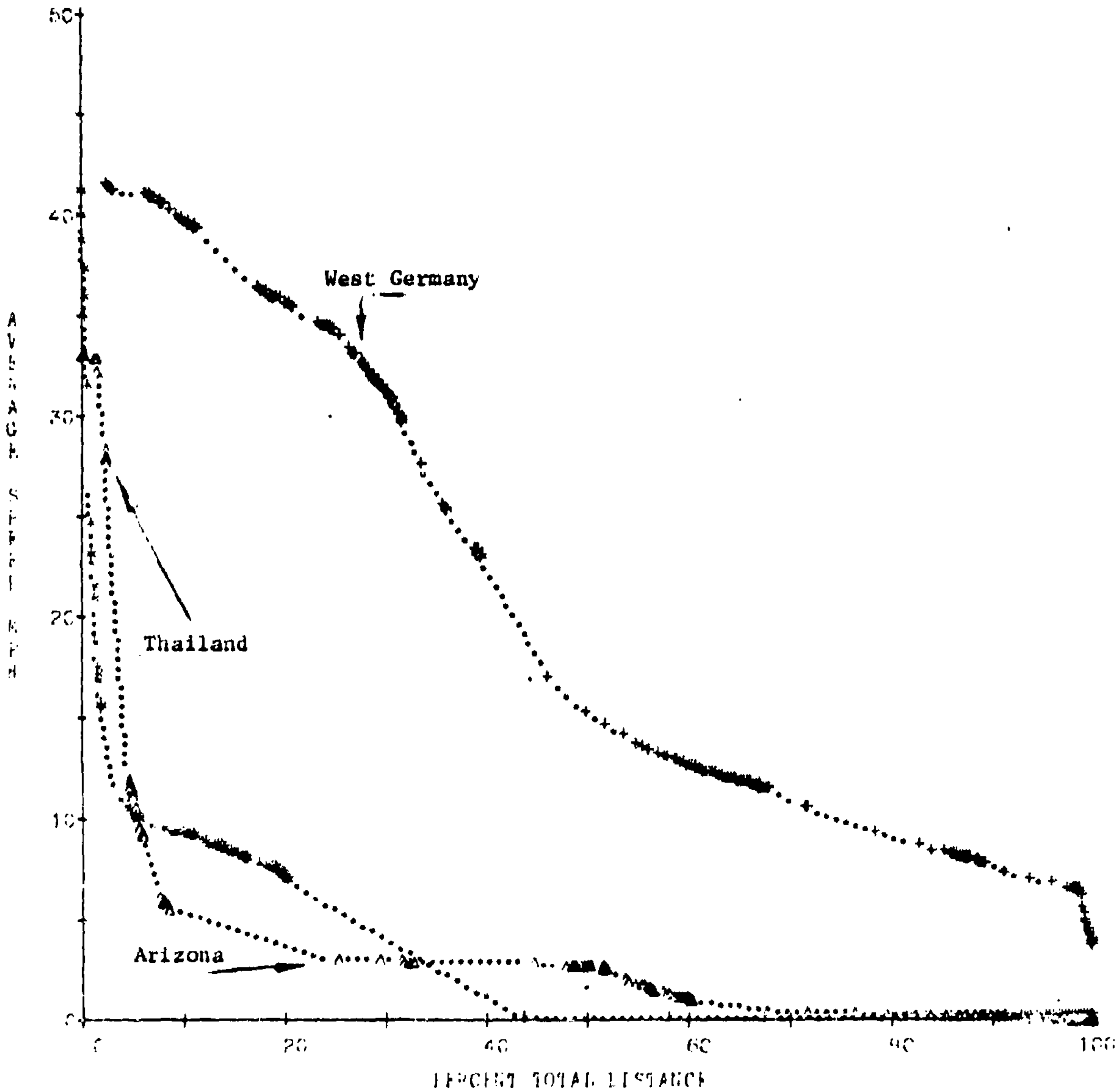


Fig. E15 (15) Off-road mobility profile, 1-1/4-ton, 4x4 truck, cargo

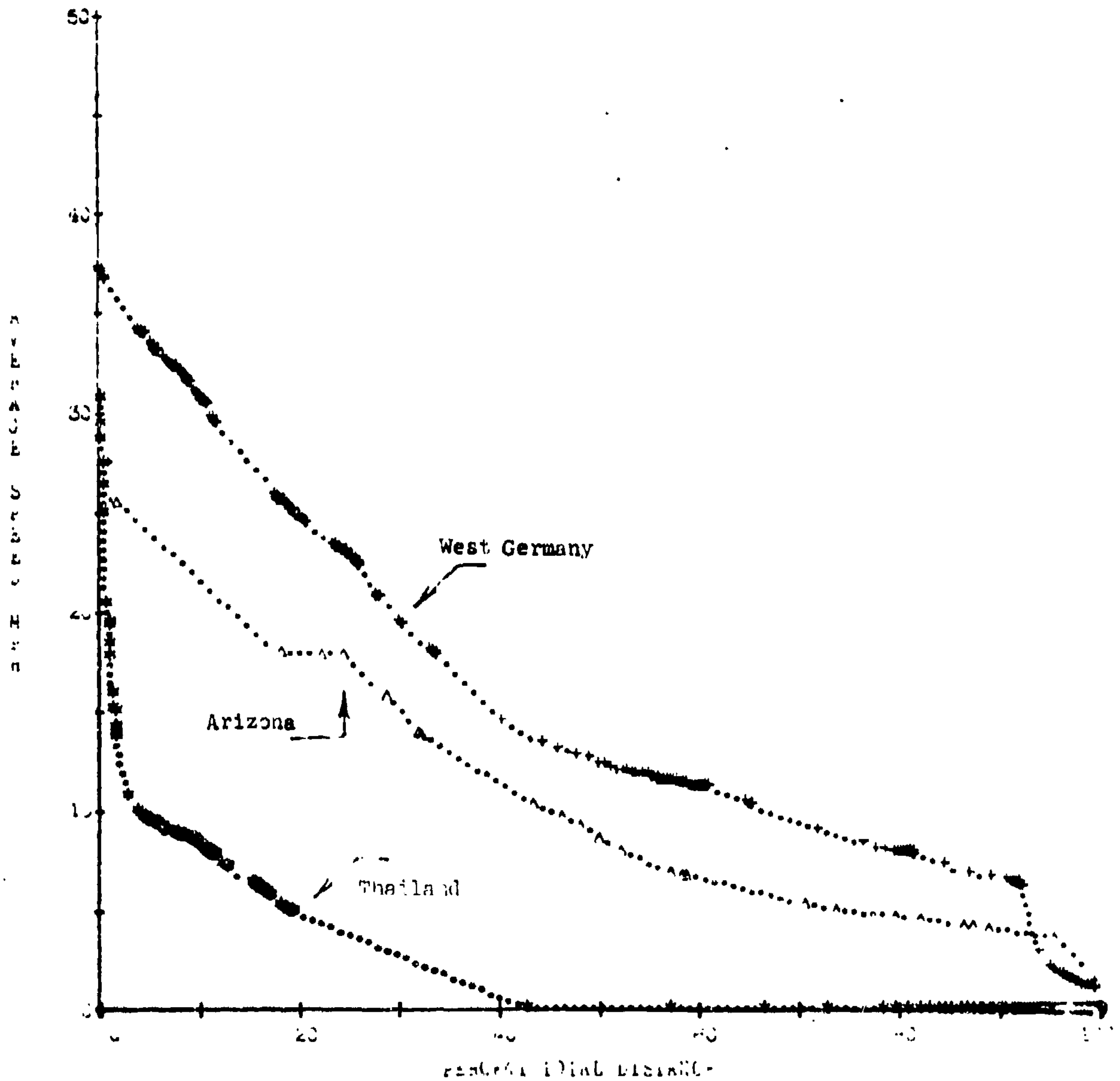


Fig. E16. (16) Off-road mobility profile, M715E1 1-1/4-ton, 4x2 truck, cargo

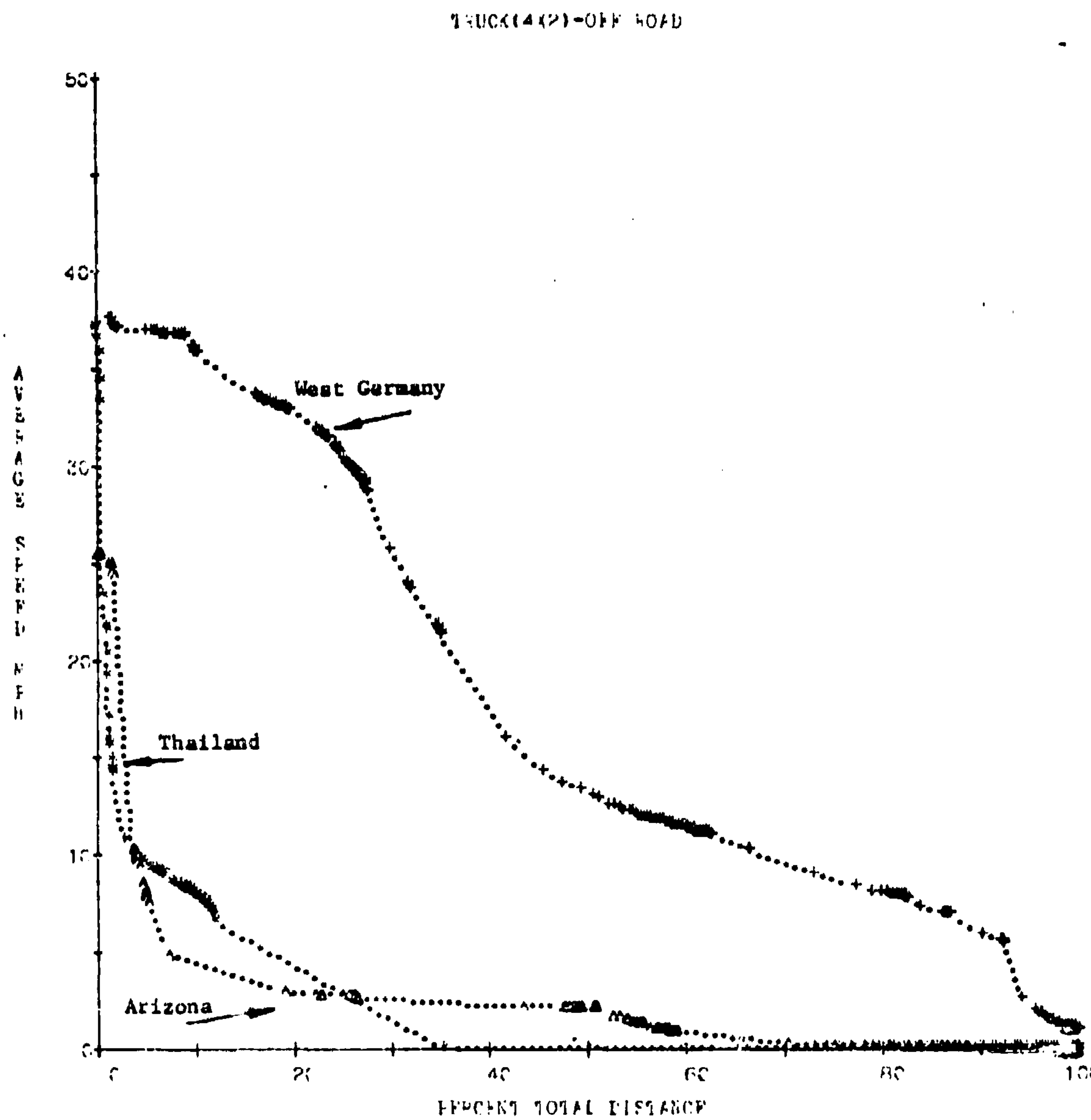


Fig. E17. (17) Off-road mobility profile, 1-1/4-ton, 4x2 truck, cargo

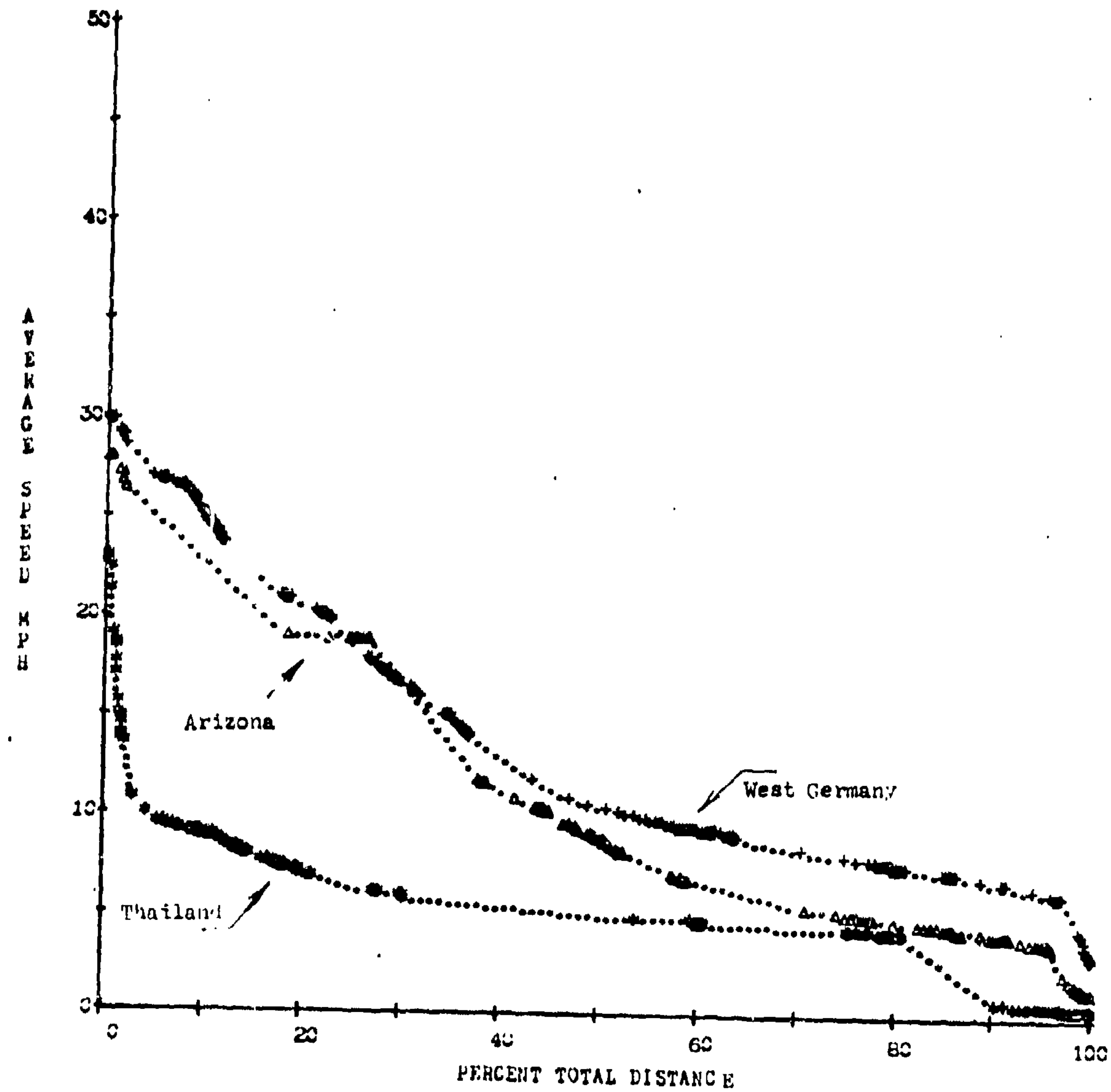


Fig. E18. (18) Off-road mobility profile, M715E1 1-1/4-ton, 4x4 truck, cargo with M101A1 trailer

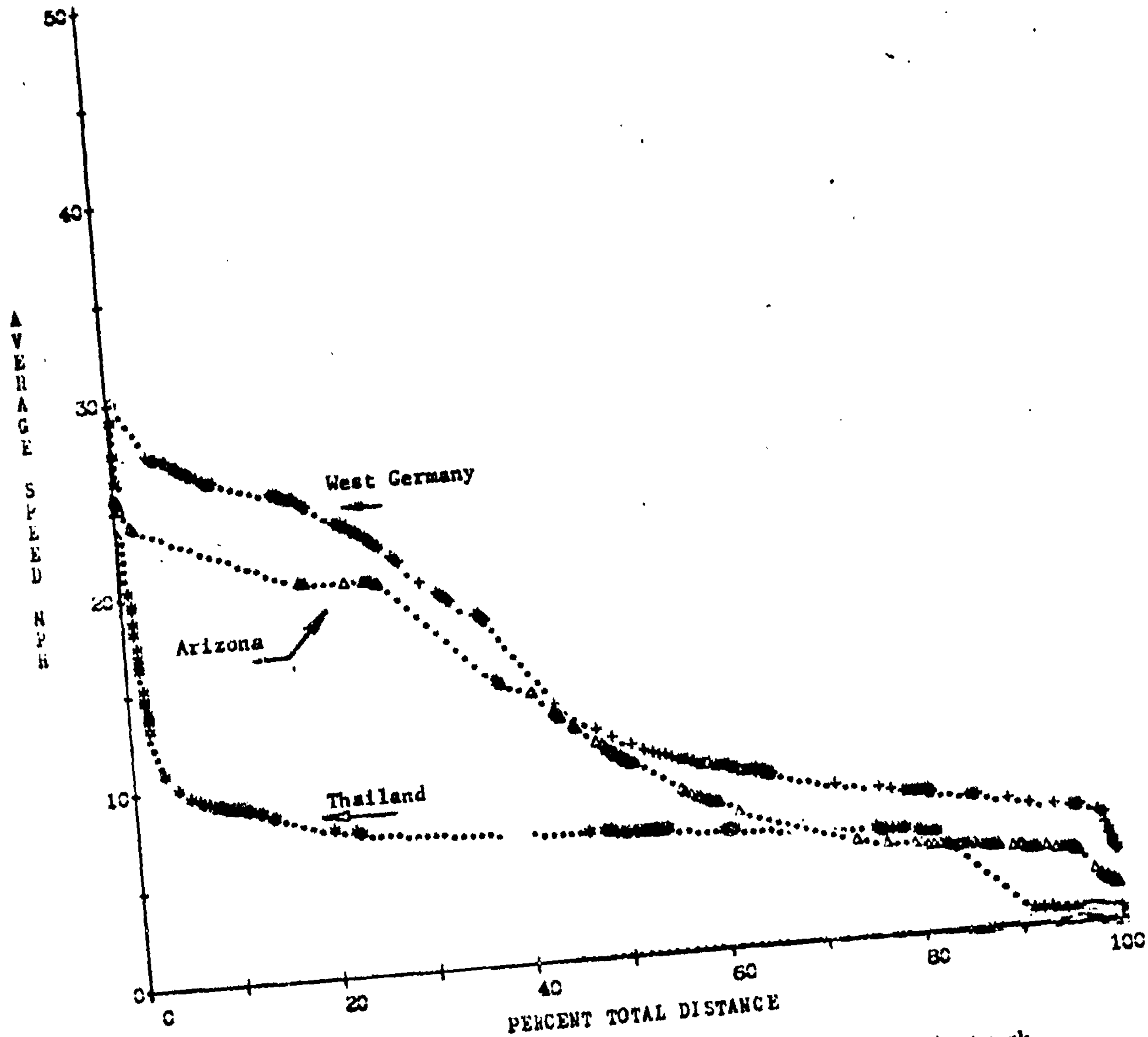


Fig. E19. (19) Off-road mobility profile, XM705 1-1/4-ton, 4x4 truck, cargo with M101A1 trailer

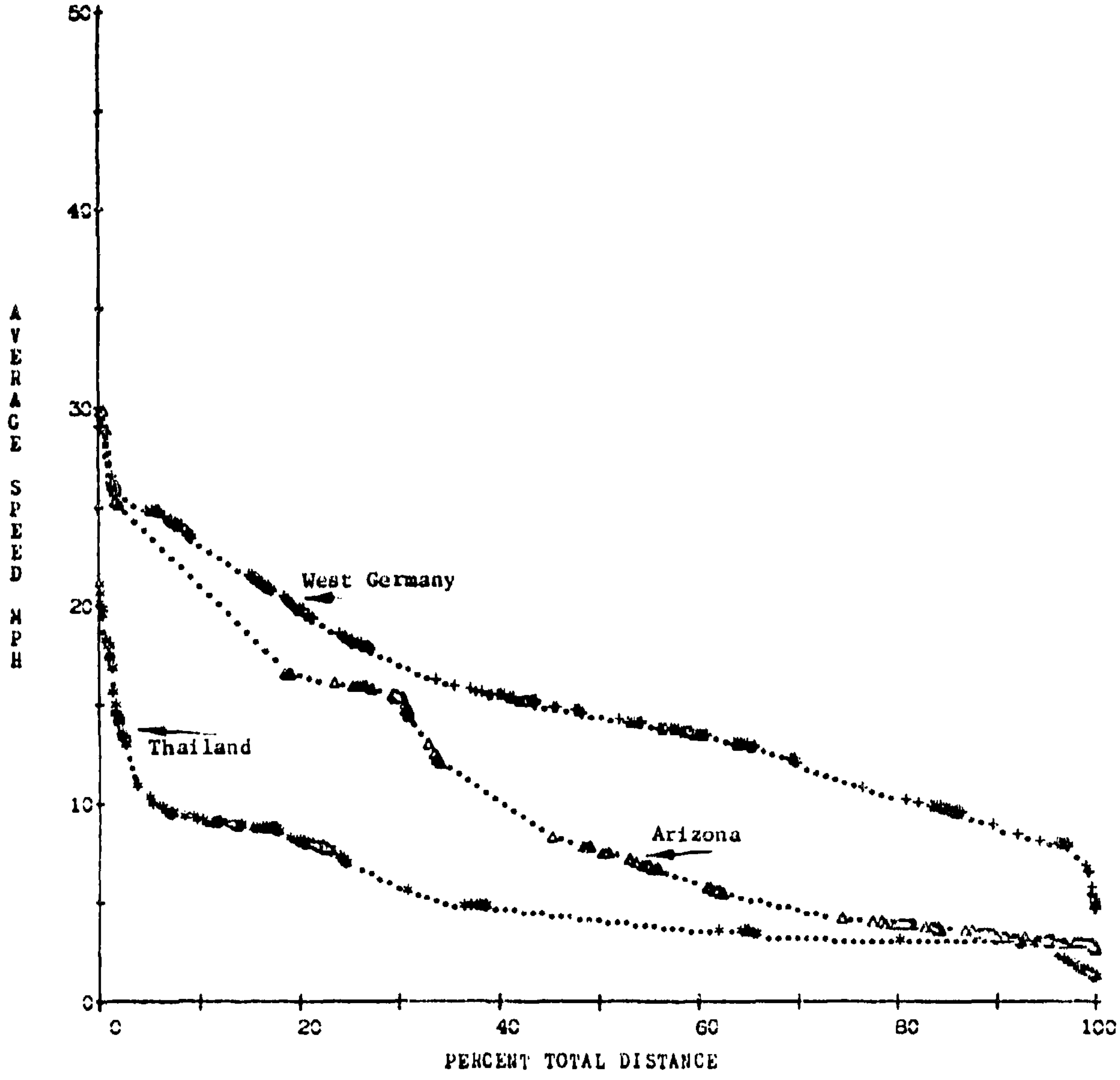


Fig E20. (20) Off-road mobility profile, M561 1-1/4-ton, 6x6 truck, cargo with M101A1 trailer

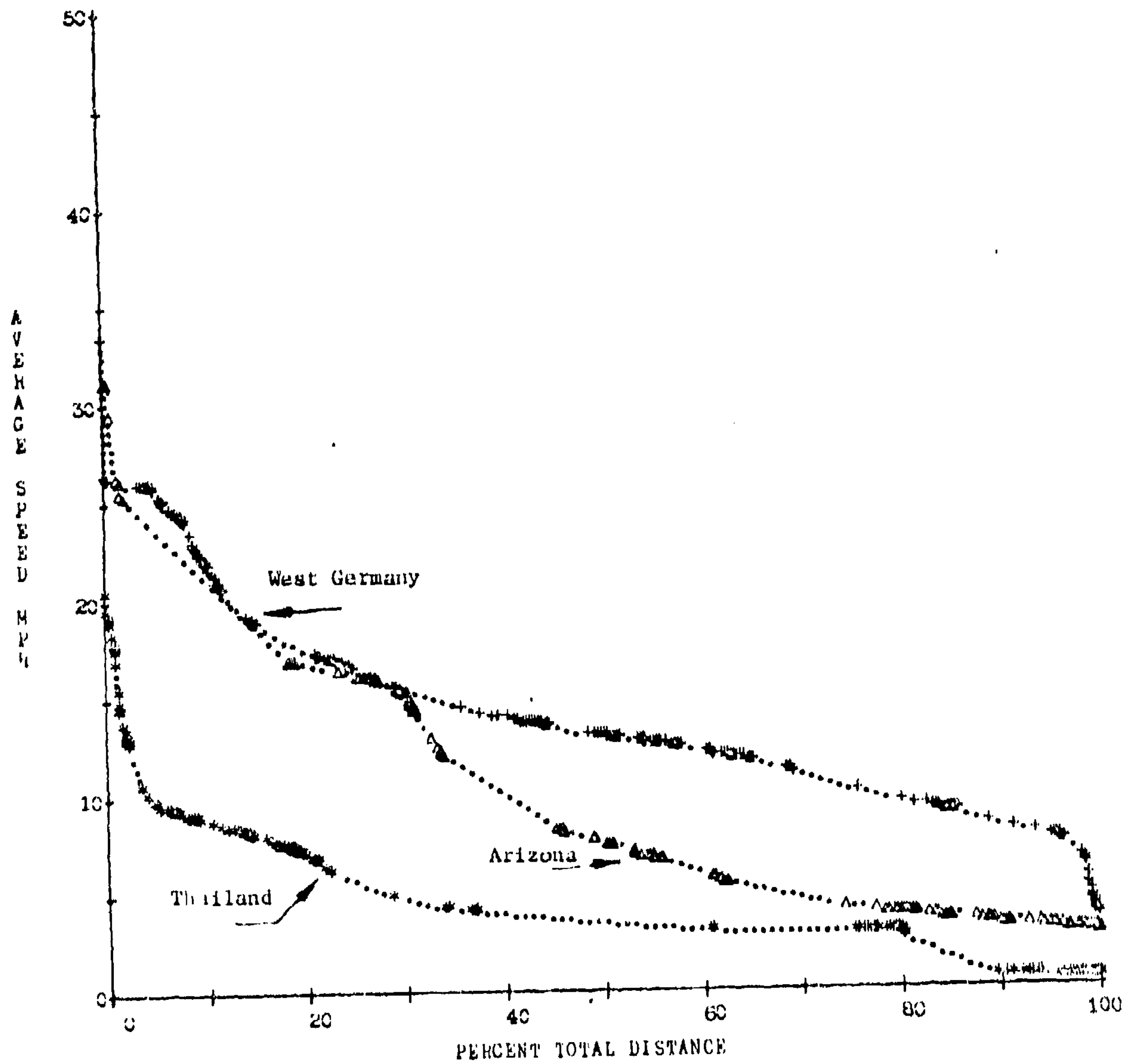


Fig. E21. (21) Off-road mobility profile, M561 1-1/4-ton, 6x6 truck, cargo with M102, 105mm, light, howitzer

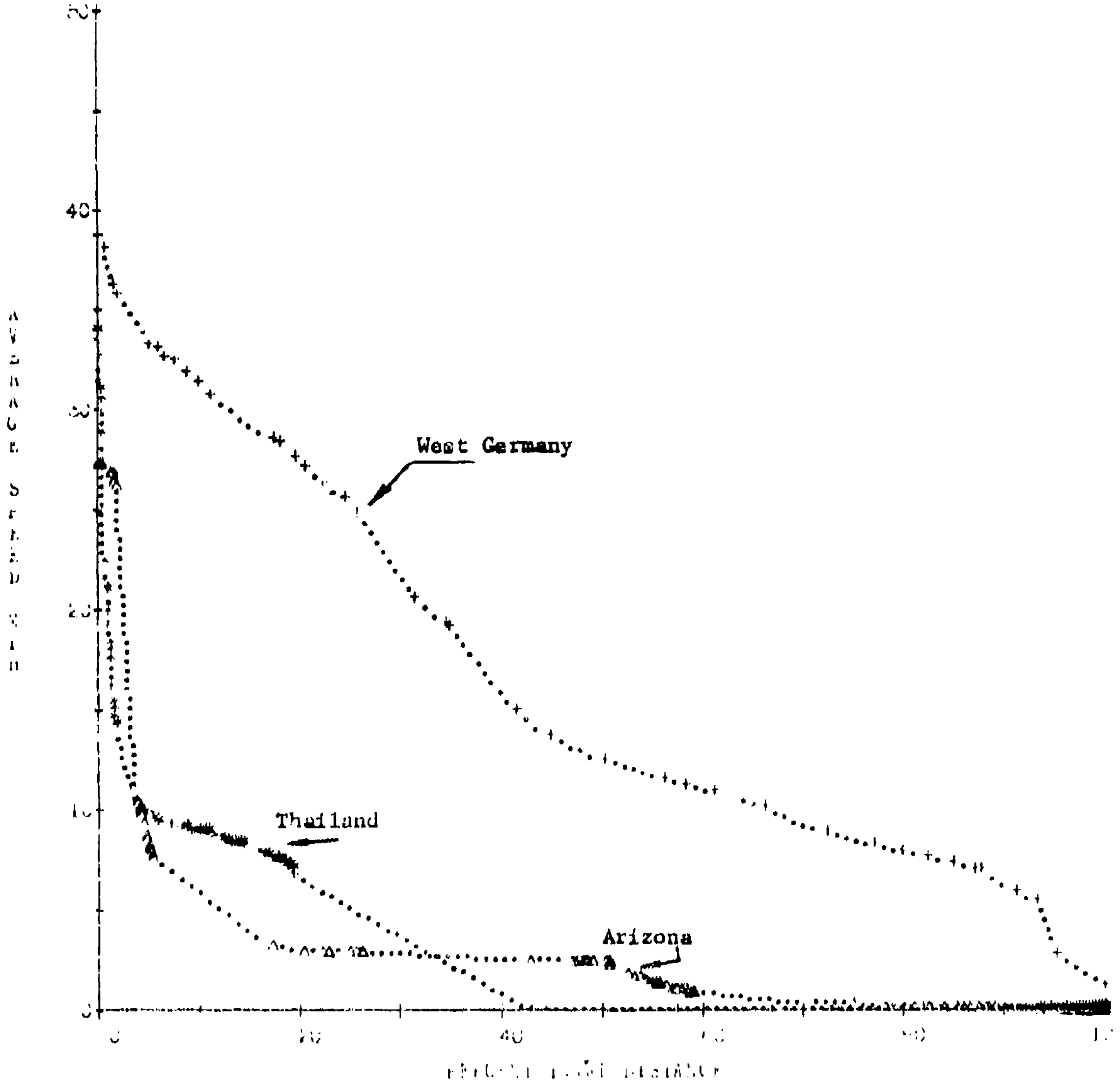


Fig. E22. (22) Off-road mobility profile, 1-1/4-ton, 4x4 truck, cargo with M101A1 trailer

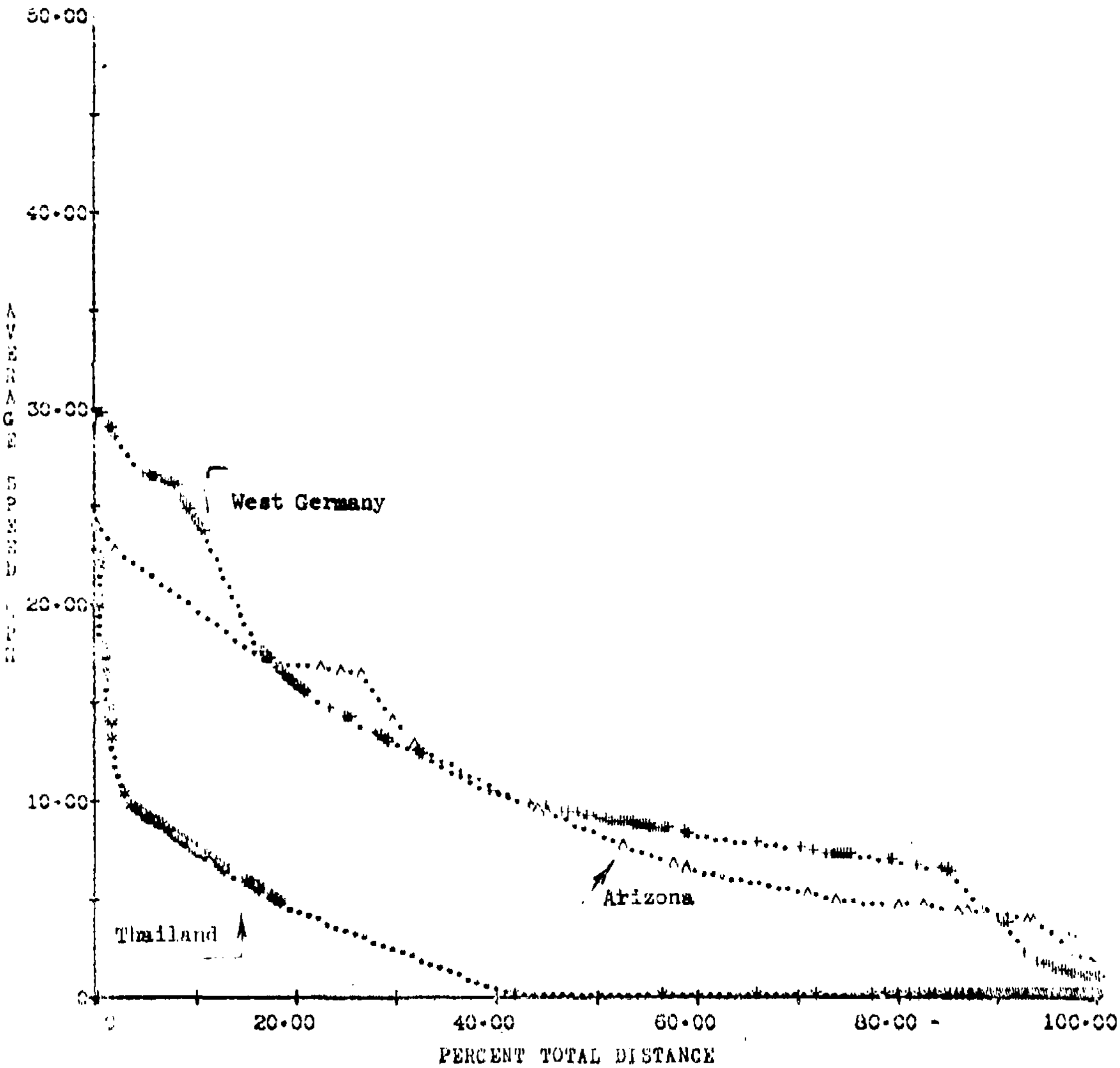


Fig. E23. (23) Off-road mobility profile, M715E1 1-1/4-ton, 4x2 truck, cargo, with M101A1 trailer

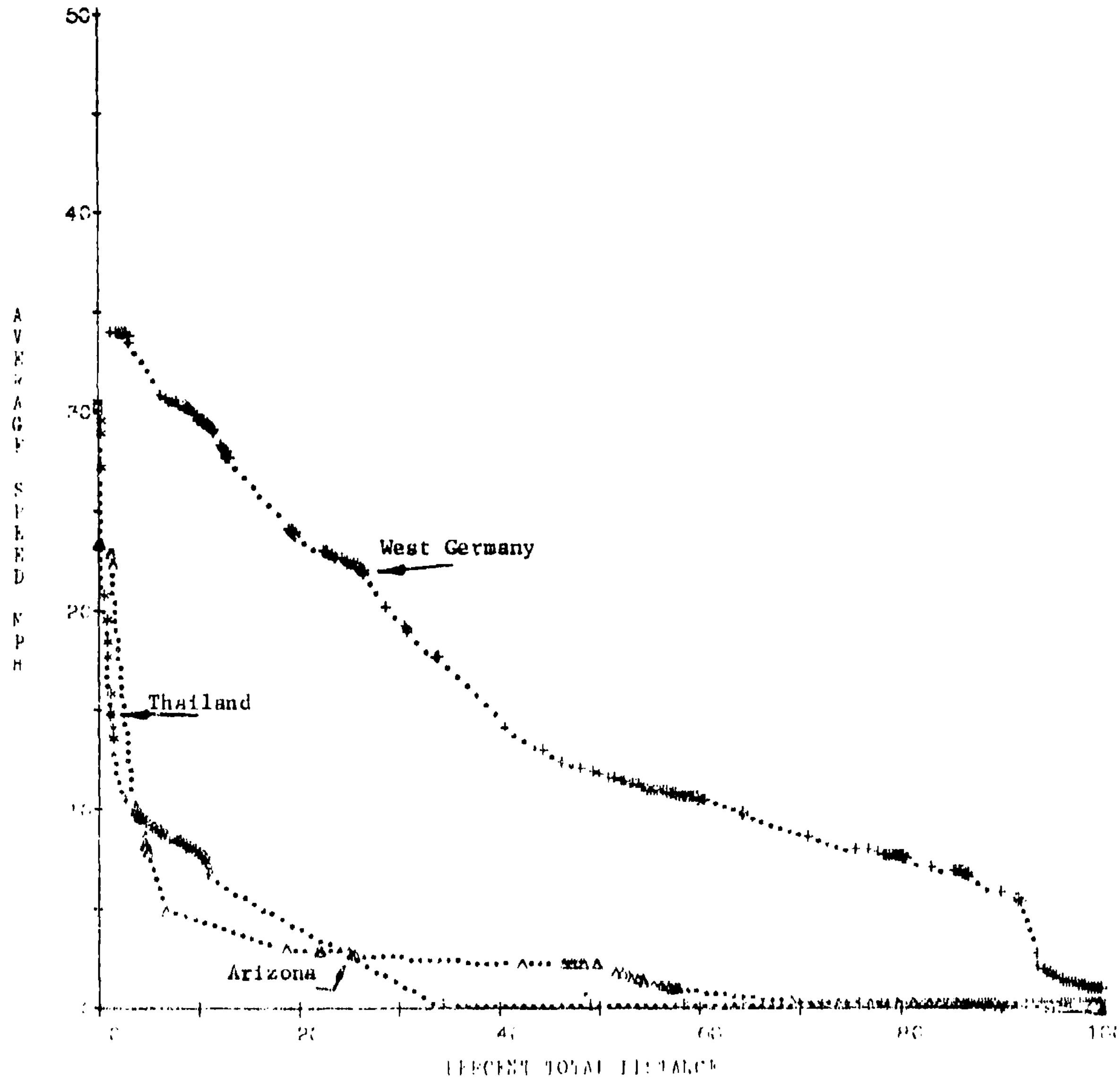


Fig. E24, (24) Off-road mobility profile, 1-1/4-ton, 4x2 truck, cargo with M101A1 trailer

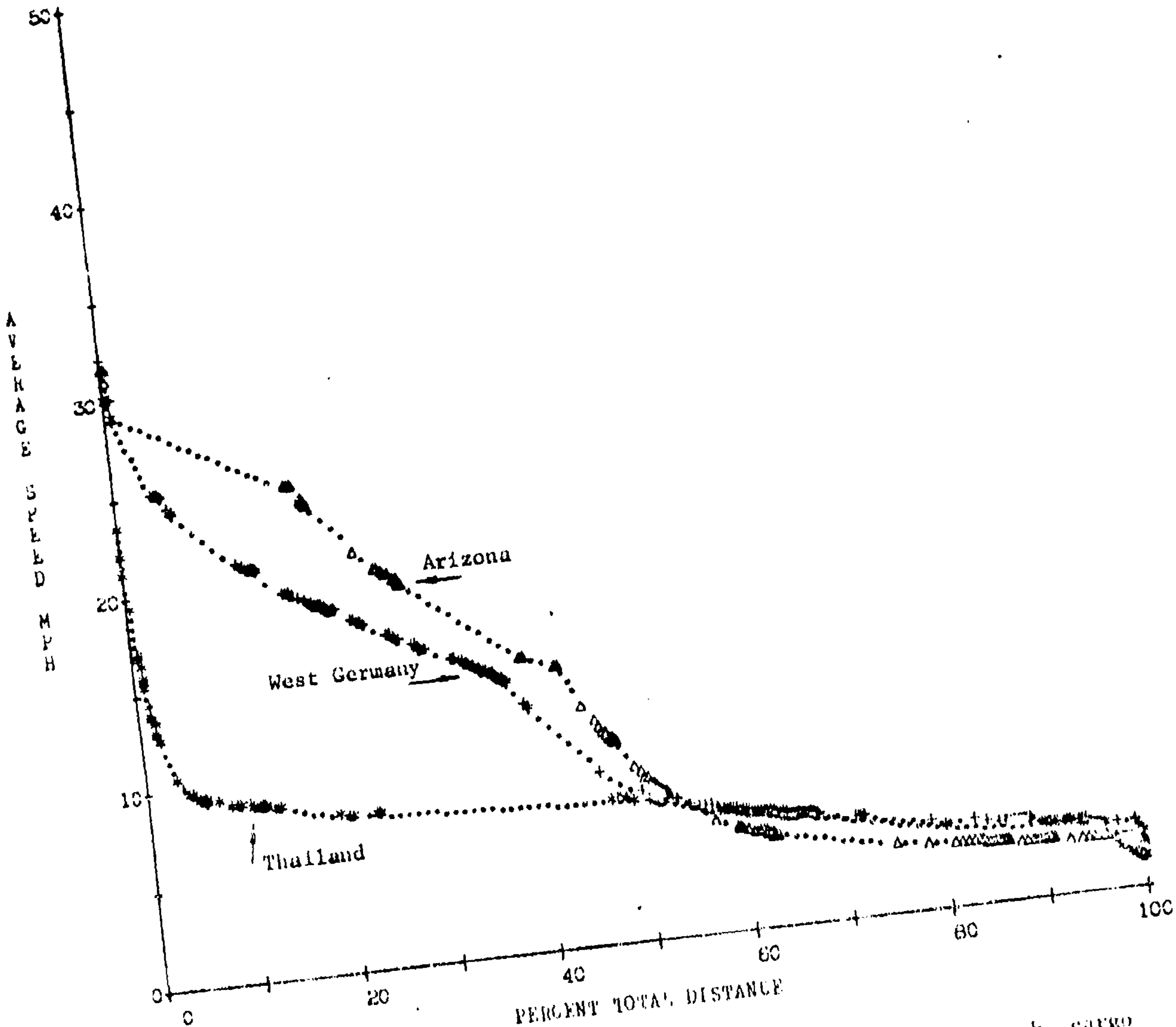


Fig. E25. (25) Off-road mobility profile, M35A2 2-1/2-ton, 6x6 truck, cargo

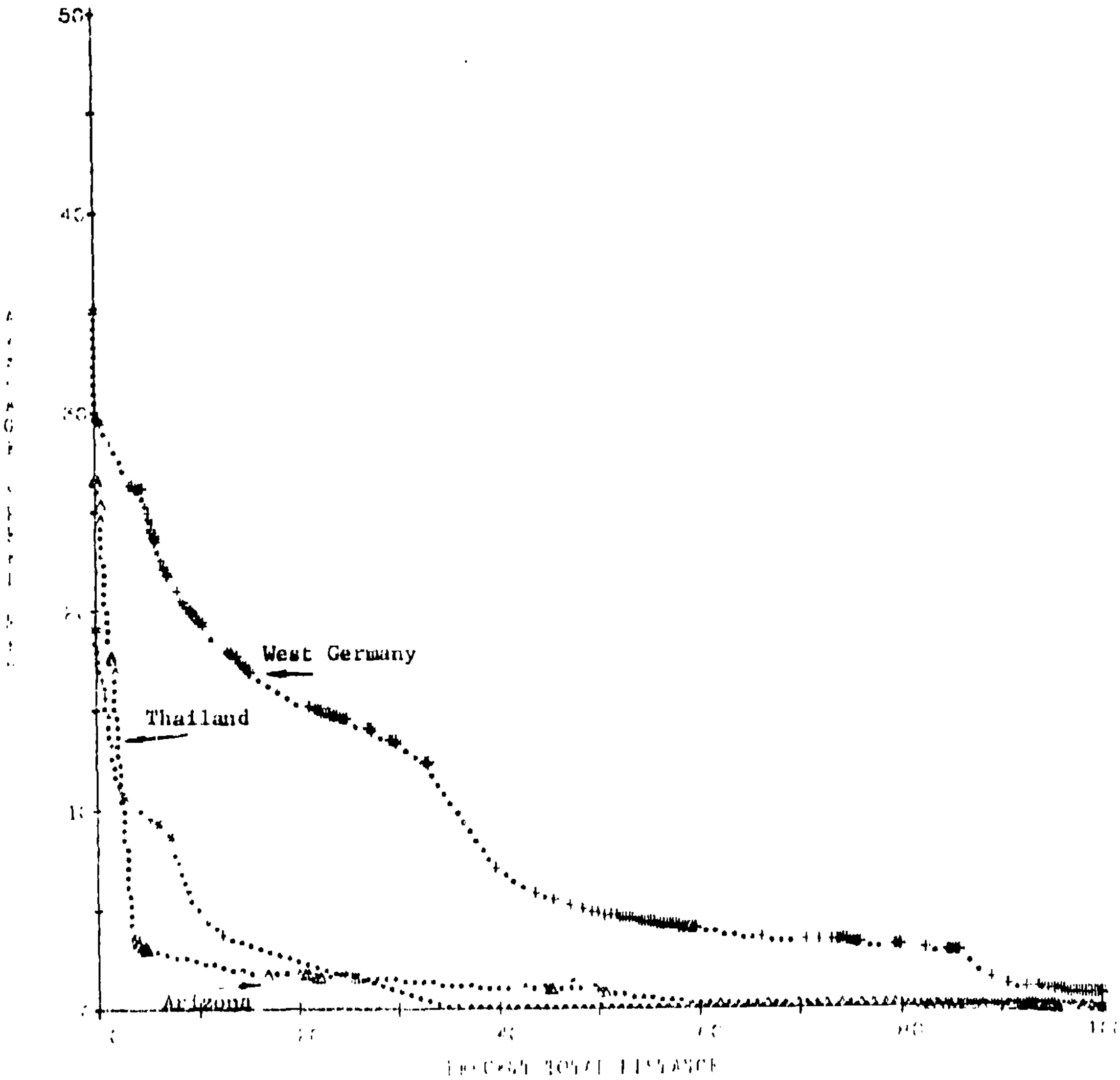


Fig. E26. (26) Off-road mobility profile, 2-1/2-ton, 4x2 truck, cargo, (151 in.WB)

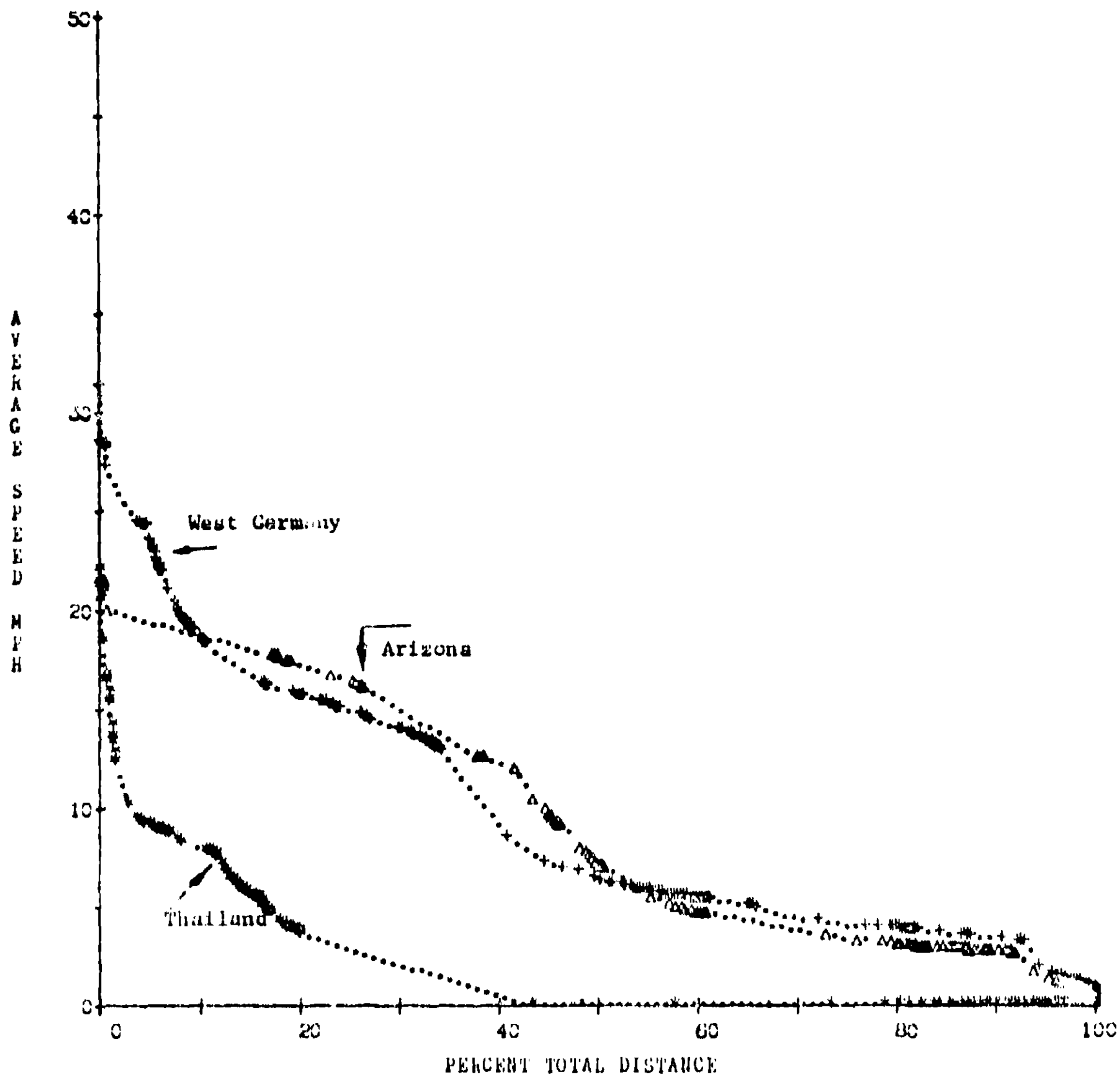


Fig. E27. (27) Off-road mobility profile, M35A2 2-1/2-ton, 6x4 truck, cargo

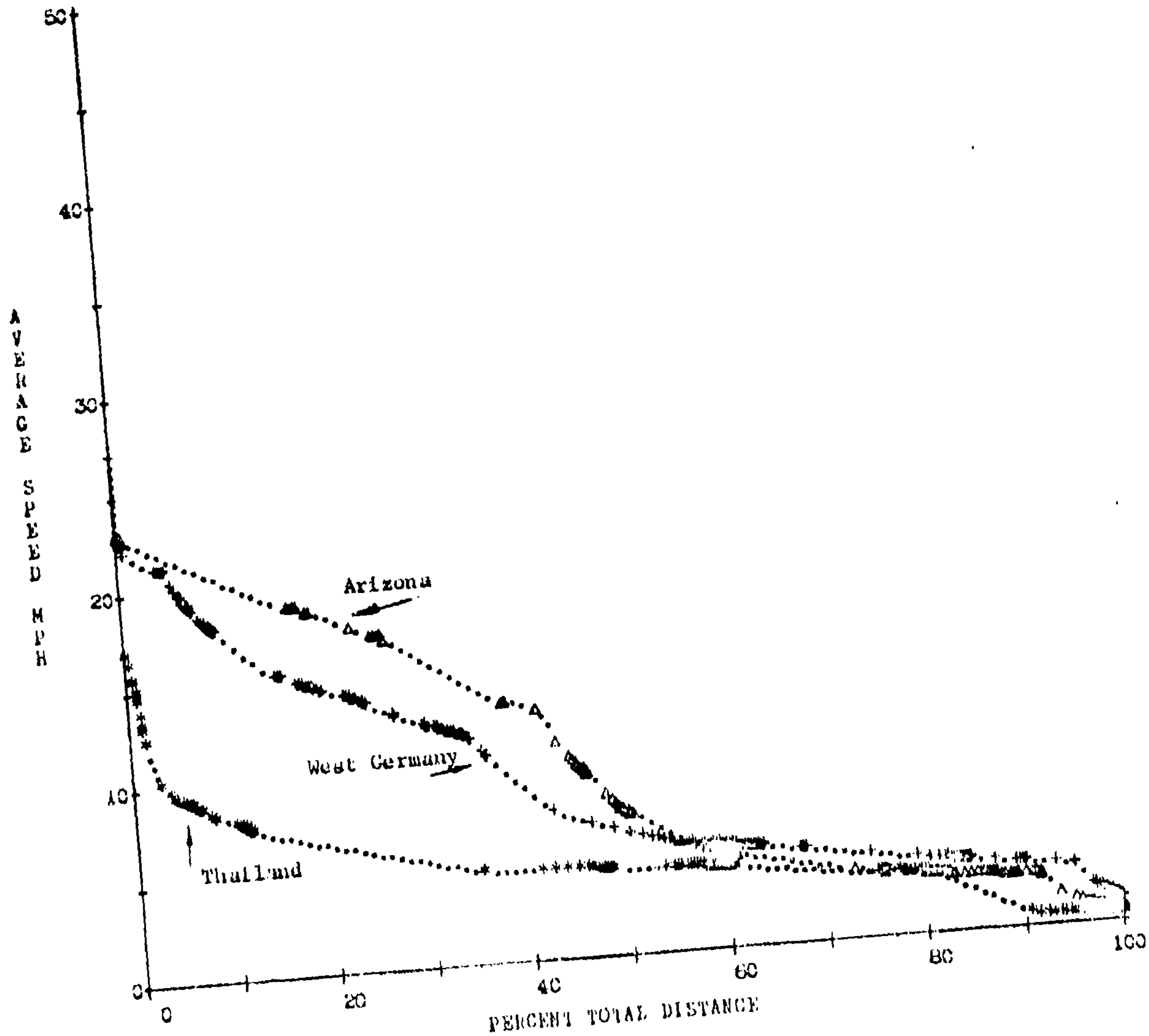


Fig. E28. (28) Off-road mobility profile, M35A2 2-1/2-ton, 6x6 truck, cargo with M105A2 trailer

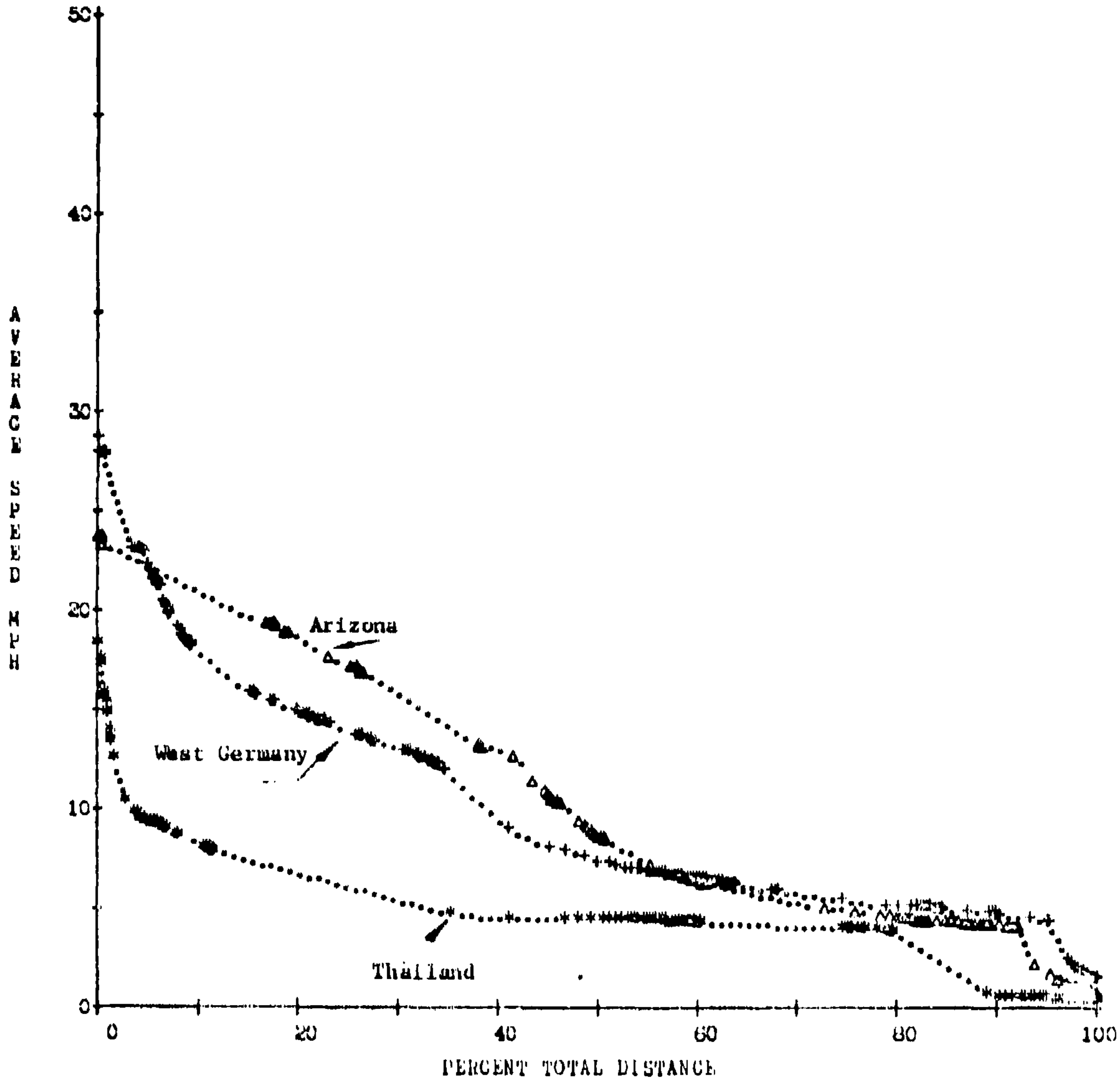


Fig. E29. (29) Off-road mobility profile, M35A2 2-1/2-ton, 6x6 truck, cargo with M102-105mm howitzer

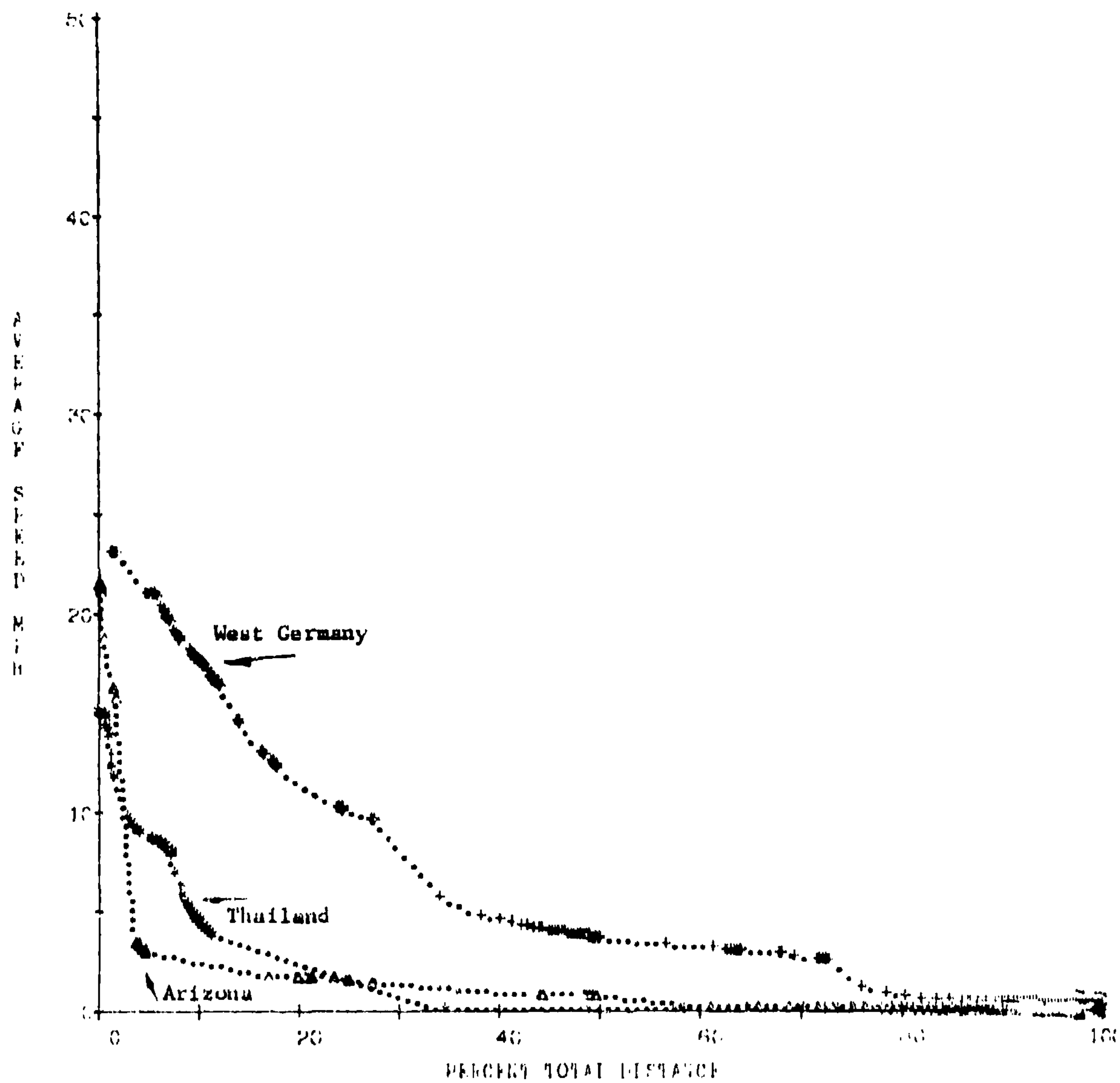


Fig. E30. (30) Off-road mobility profile, 2-1/2-ton, 4x2 truck, cargo, (151 in. WB) with M105A2 trailer

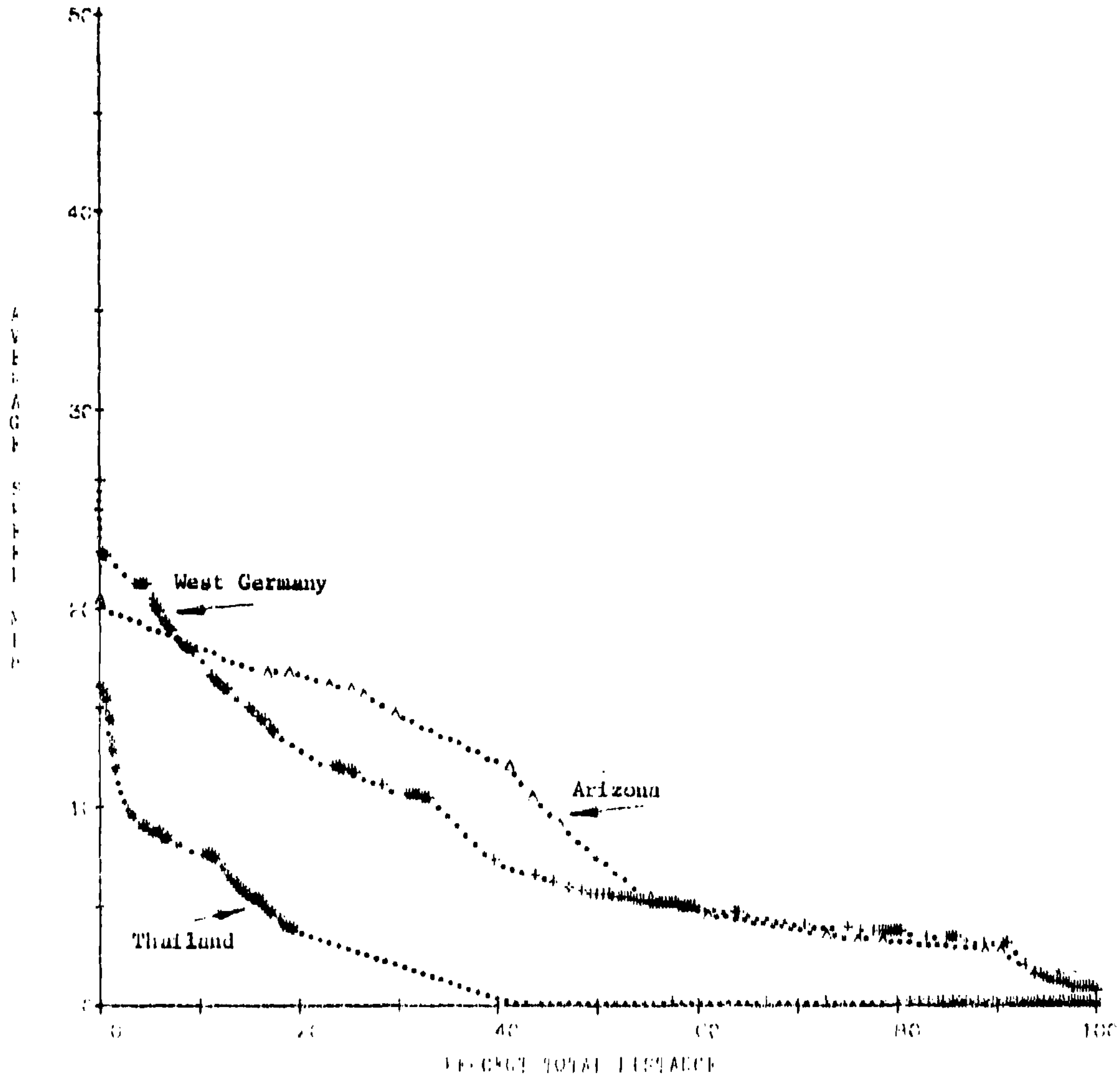


Fig. E31. (31) Off-road mobility profile, M35A2 2 1/2-ton, 6x4 truck, cargo with M105A2 trailer

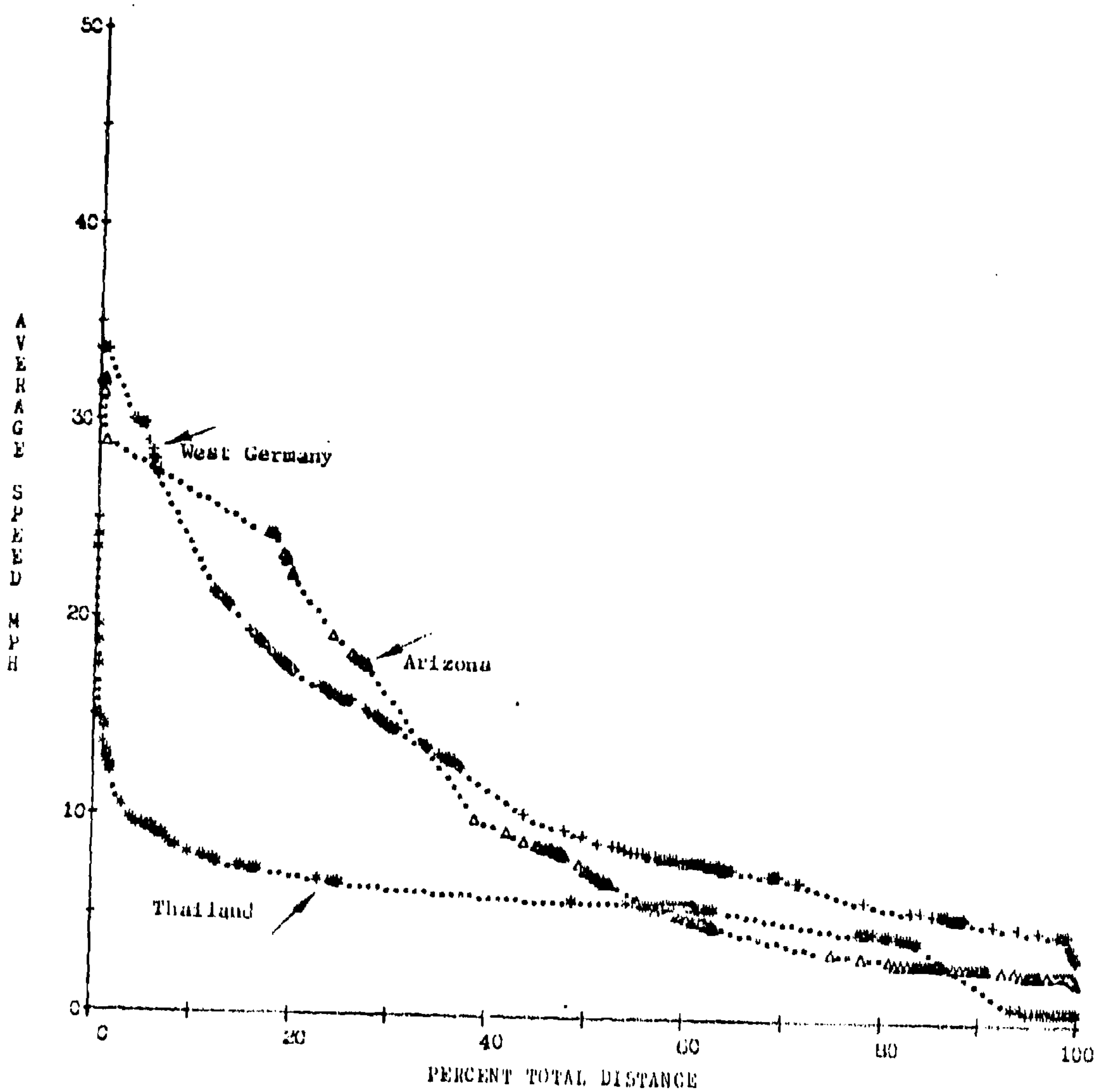


Fig. E32. (32) Off-road mobility profile, M813 5-ton, 6x6 truck, cargo

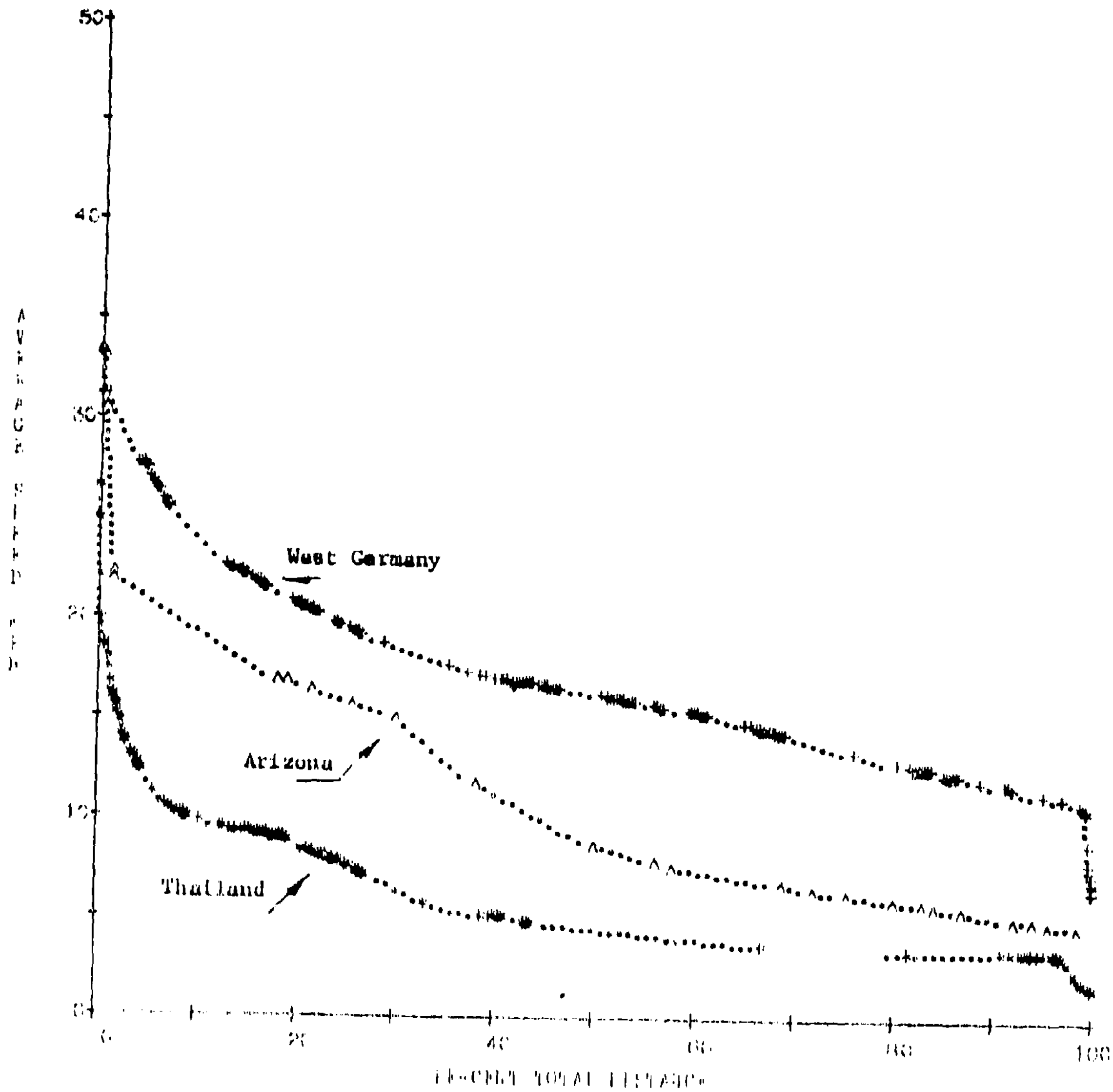


Fig. E33. (33) Off-road mobility profile, M656 5-ton, 8x8 truck, cargo

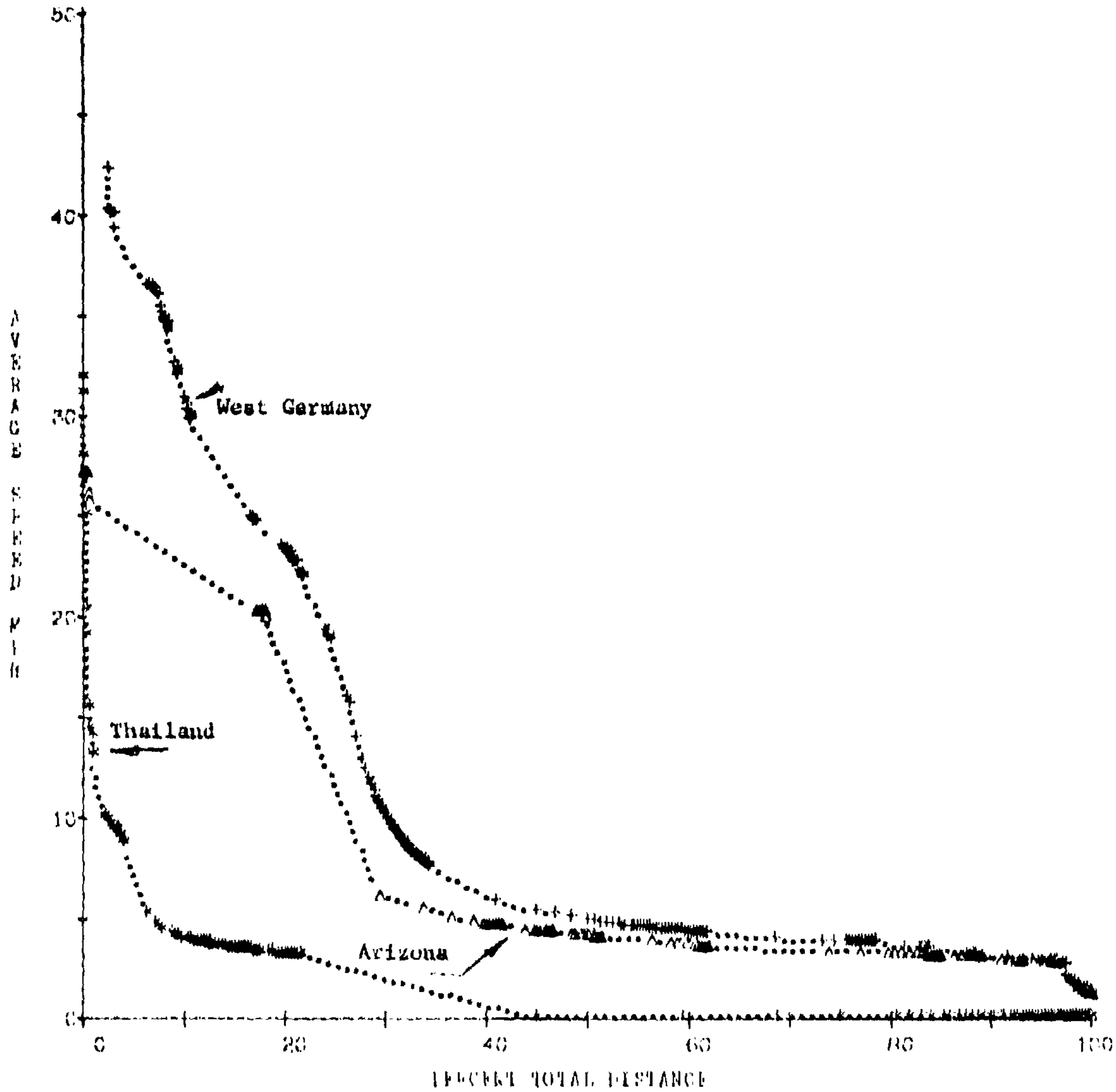


Fig. E34. (34) Off-road mobility profile, 5-ton, 6x4 truck, cargo

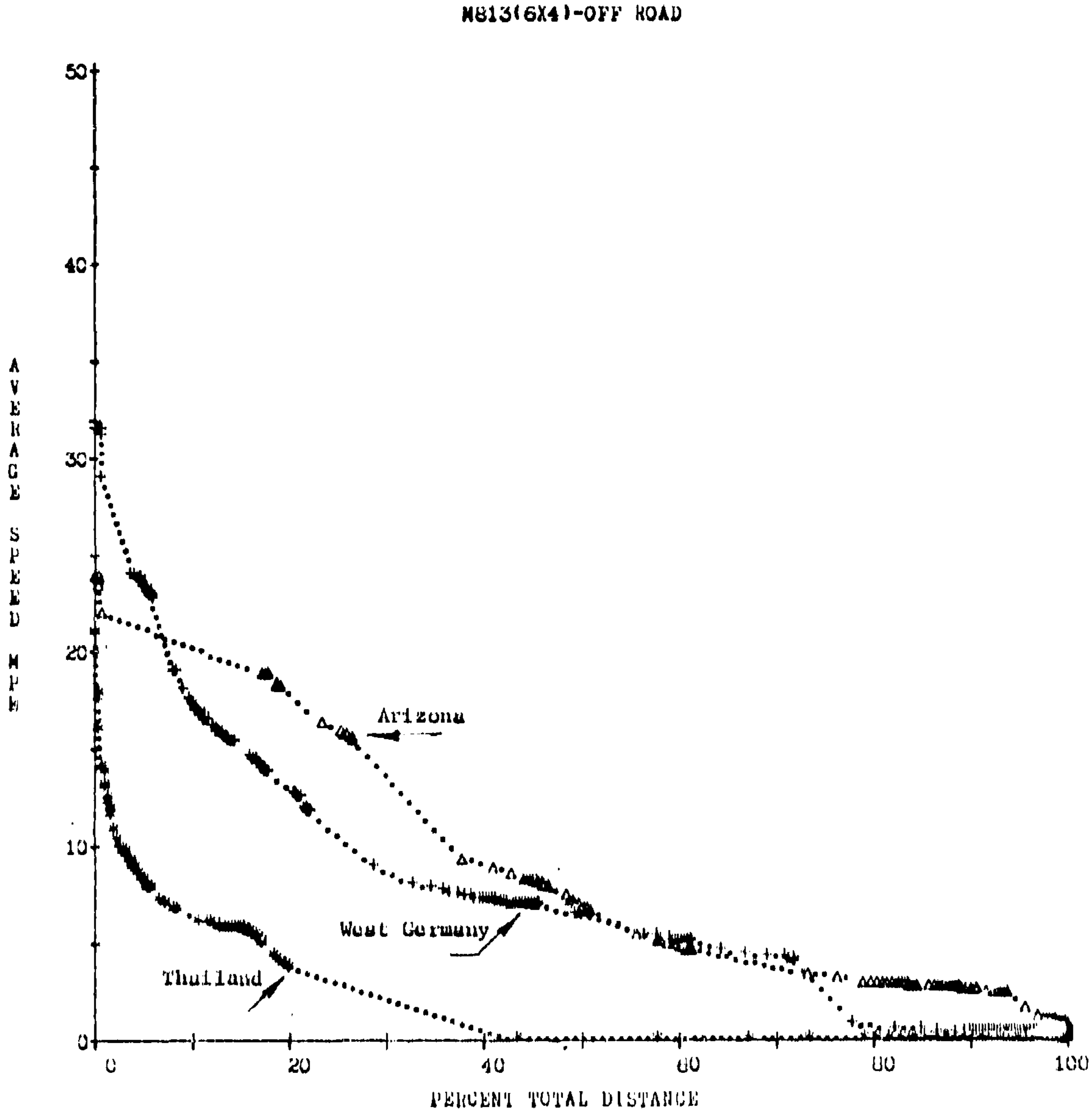


Fig. E35. (35) Off-road mobility profile, M813 5-ton, 6x4 truck, cargo

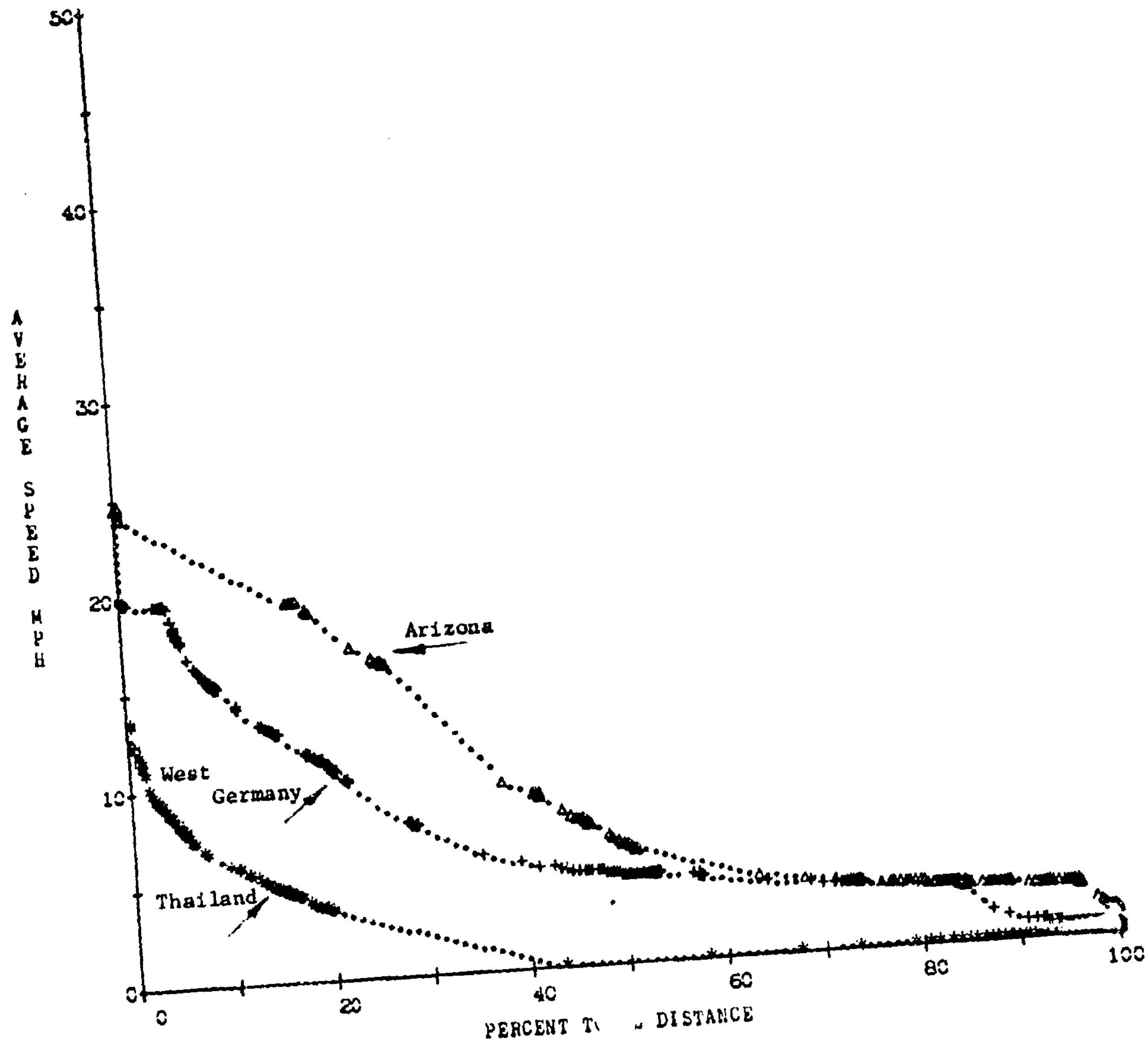


Fig. E36. (36) Off-road mobility profile, M813 5-ton, 6x6 truck, cargo with M114A1-155mm howitzer

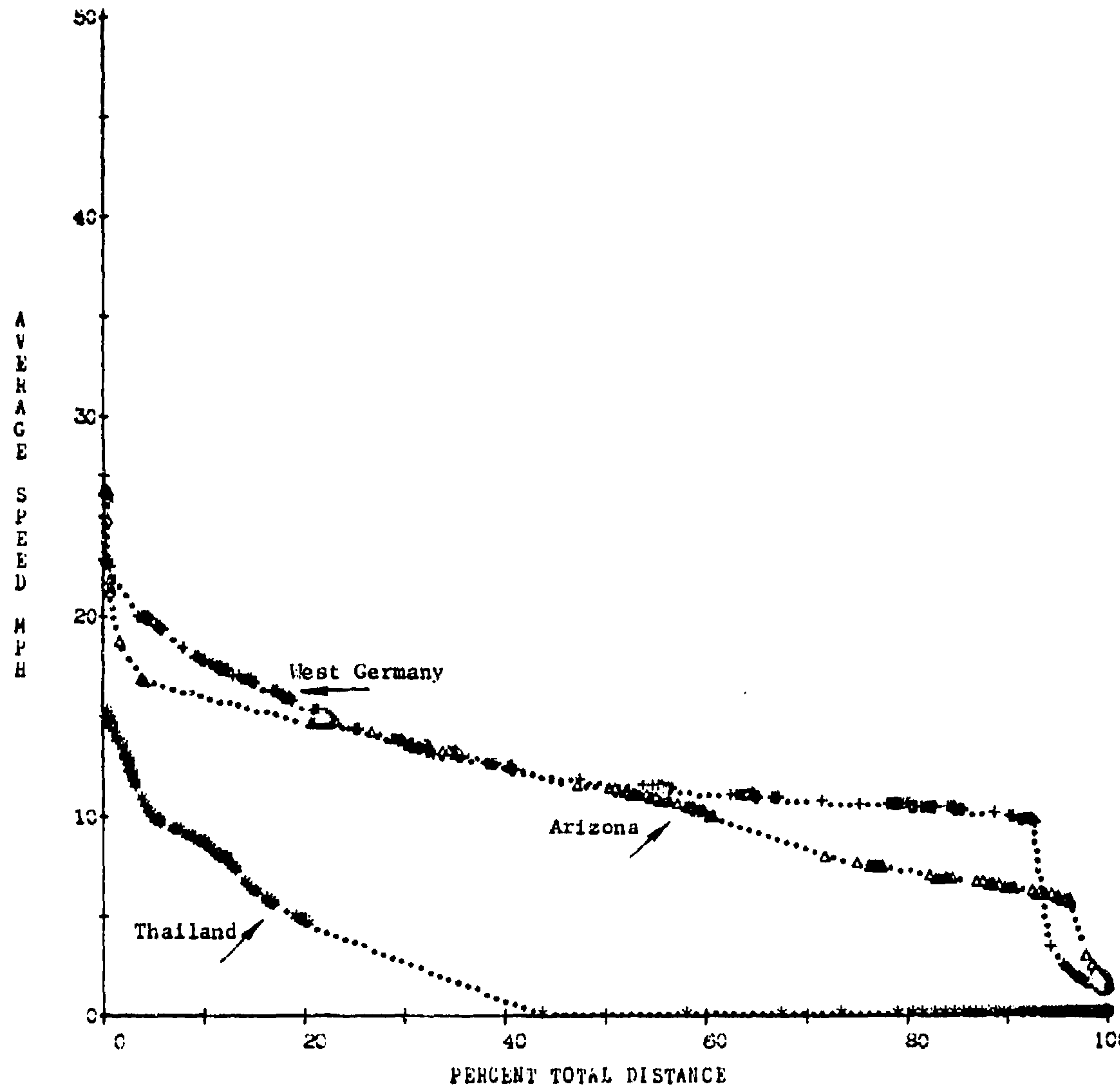


Fig. E37. (37) Off-road mobility profile, M656 5-ton, 8x8 truck, cargo with M114A1-155mm howitzer

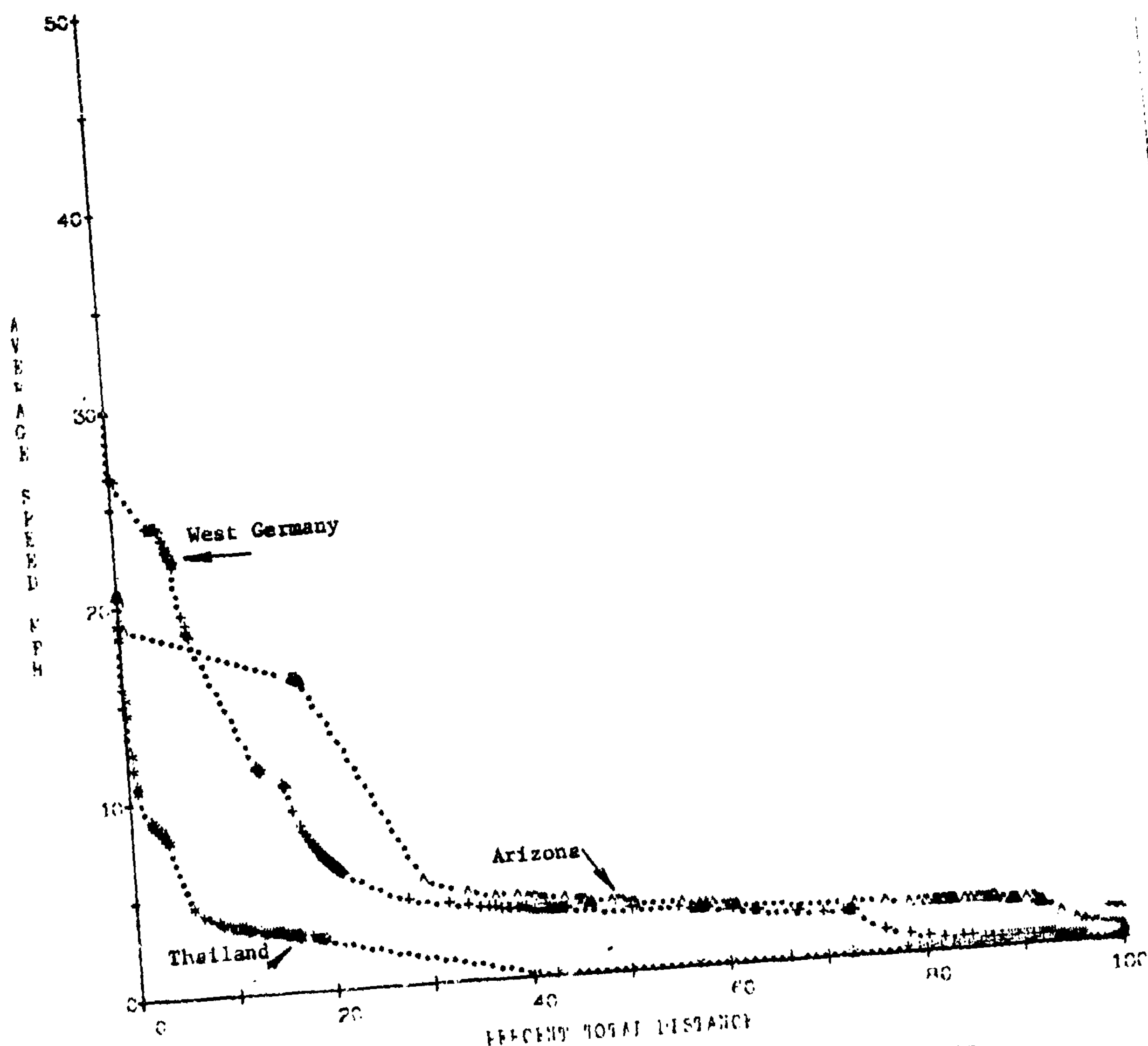


Fig. E38. (38) Off-road mobility profile, 5-ton, 6x4 truck, cargo with trailer

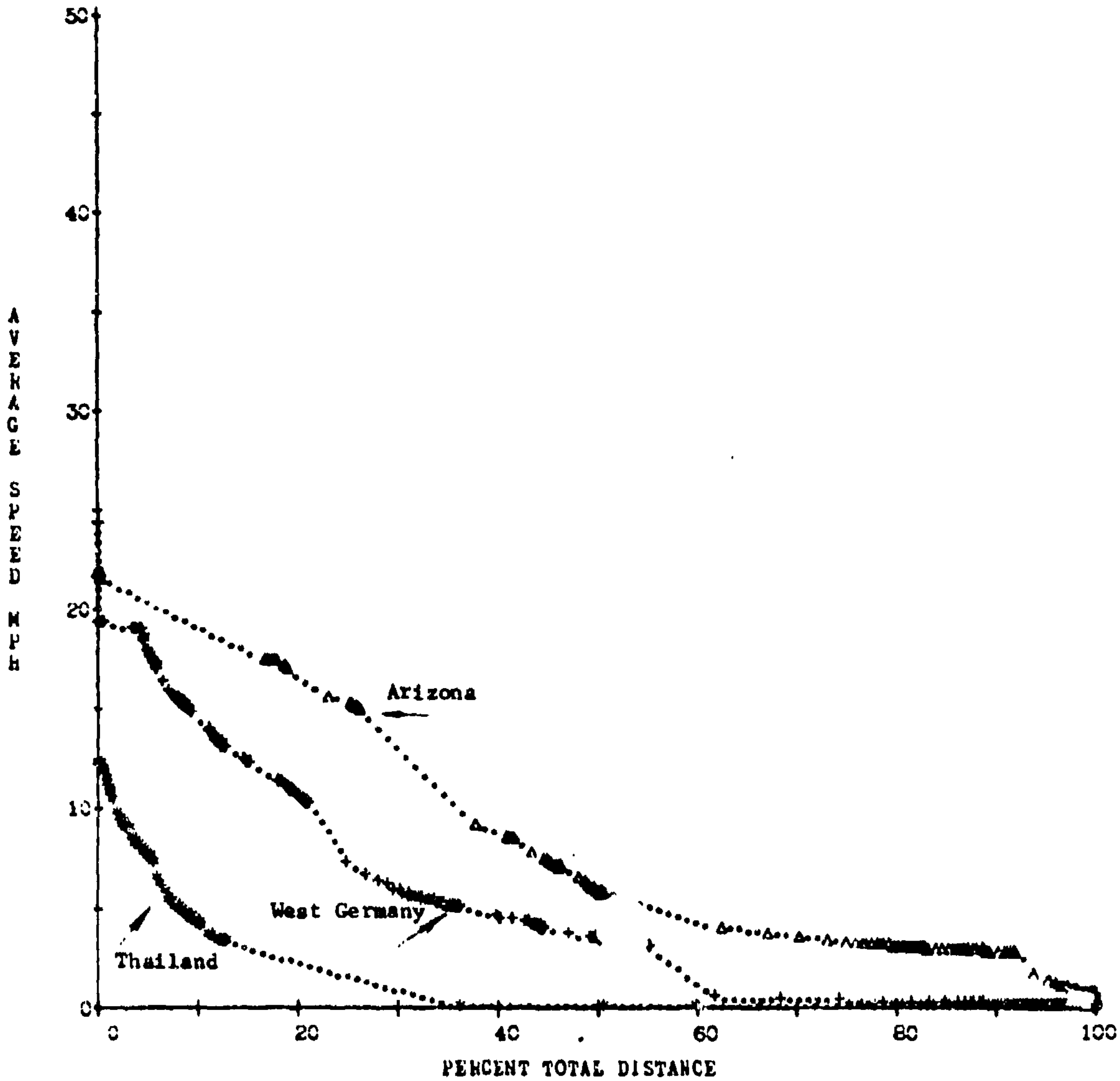


Fig. E39. (39) Off-road mobility profile, M813 5-ton, 6x4 truck, cargo with trailer

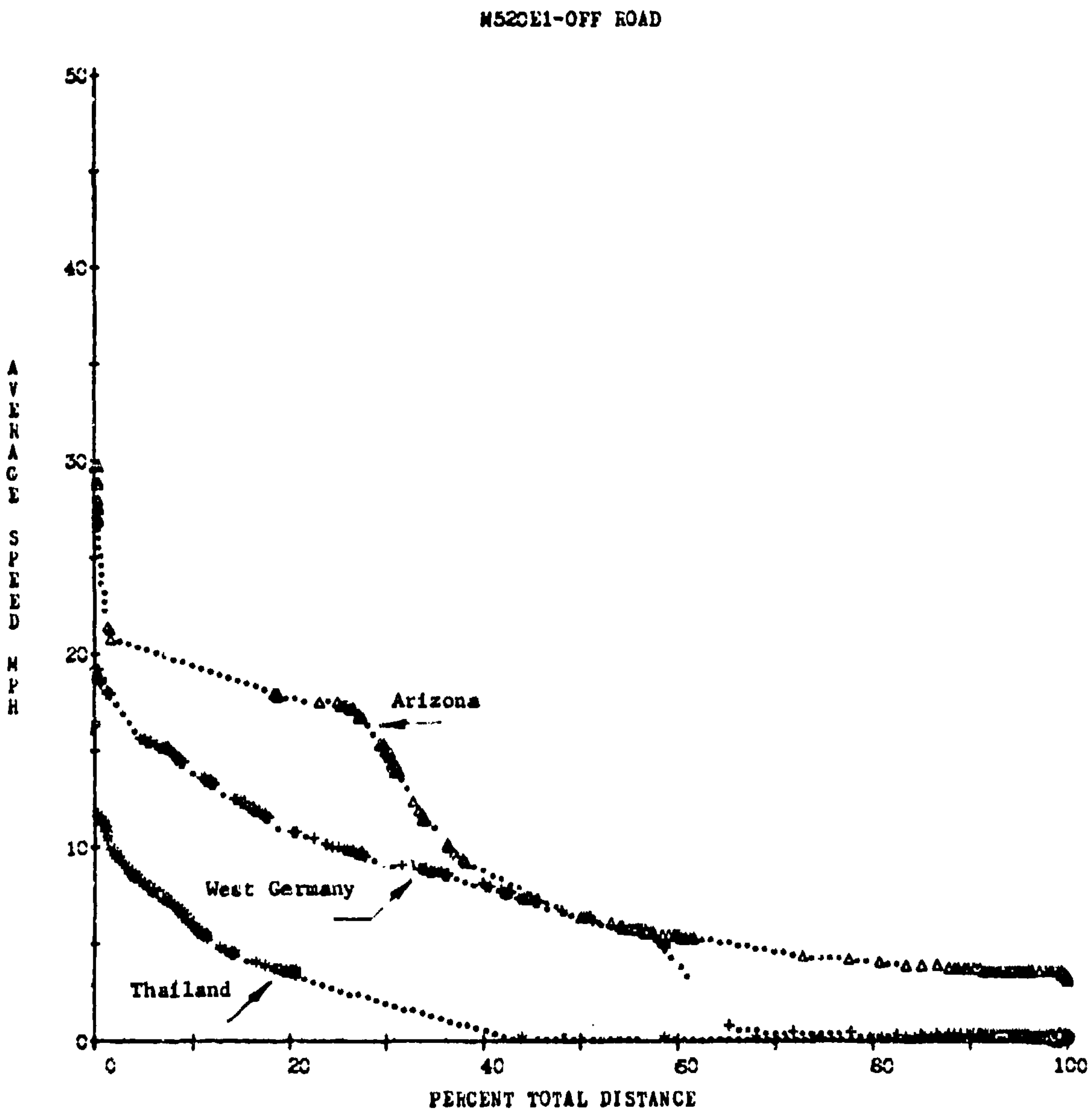


Fig. E40. (40) Off-road mobility profile, M520E1 8-ton, 4x4 truck, cargo

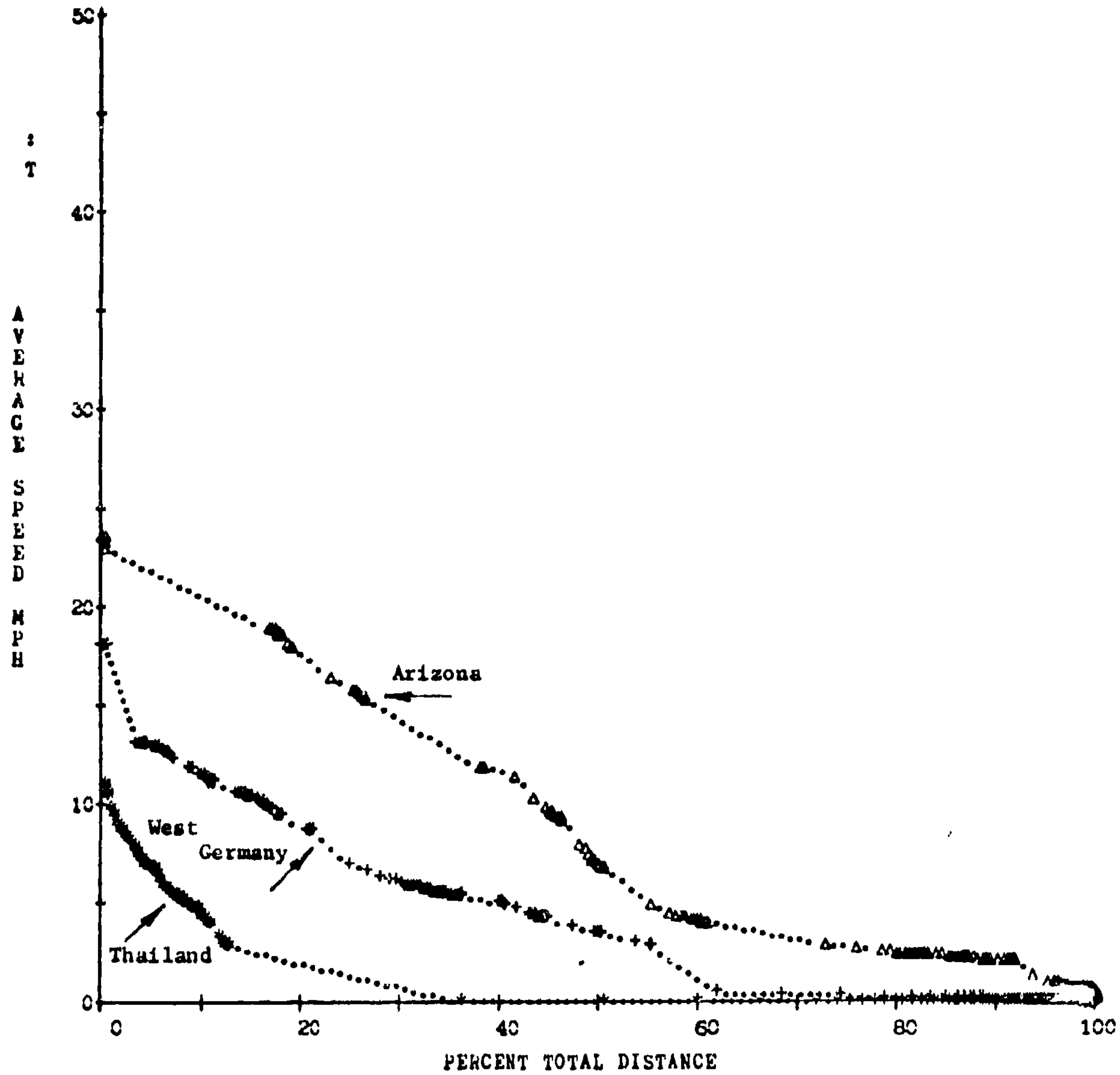


Fig. E41. (41) Off-road mobility profile, M818 5-ton, 6x6 truck, tractor with M127A1C semitrailer

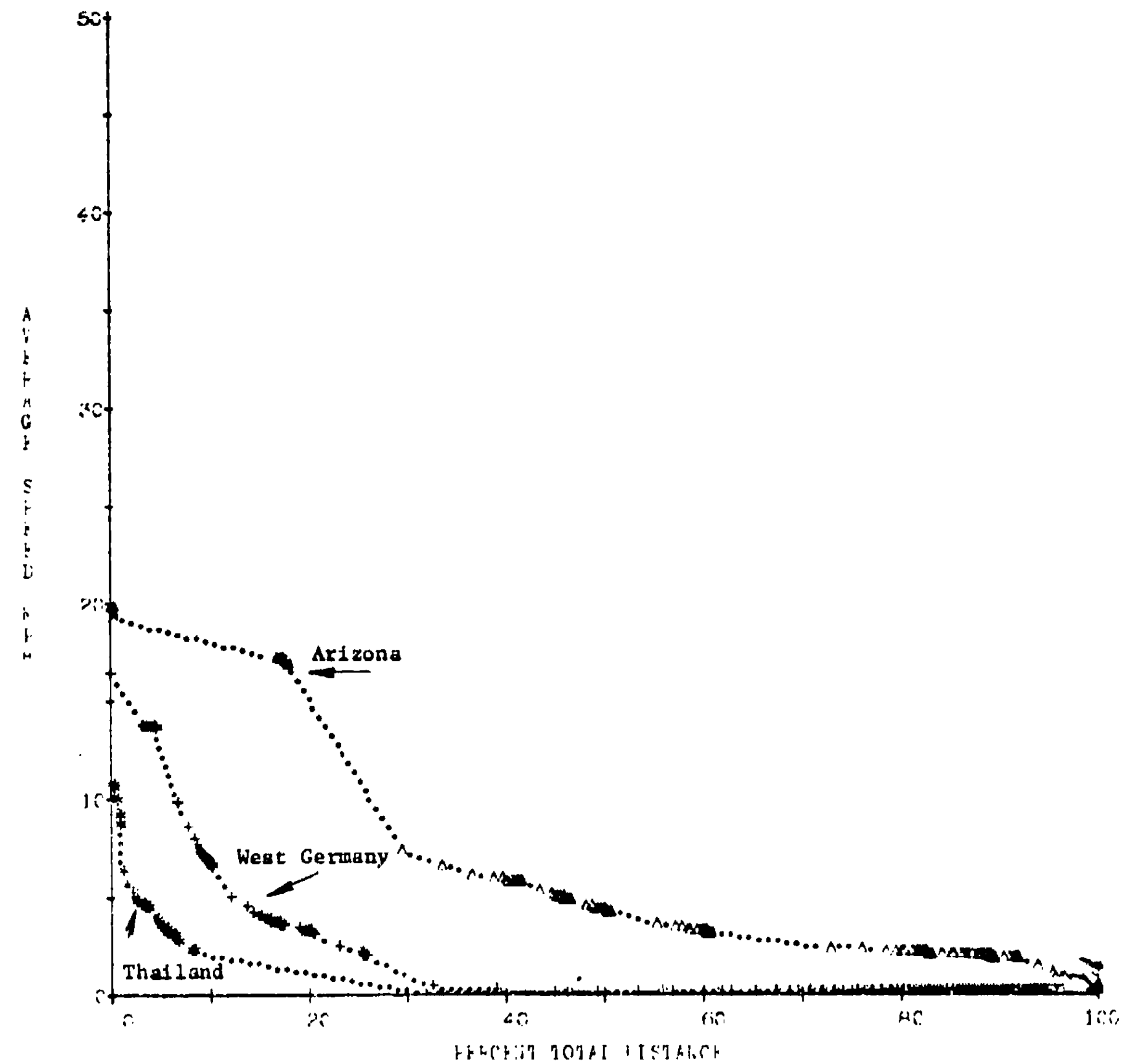


Fig. E42. (42) Off-road mobility profile, 5-ton, 6x4 truck, tractor, (152 in. WB) with M127A1C semitrailer

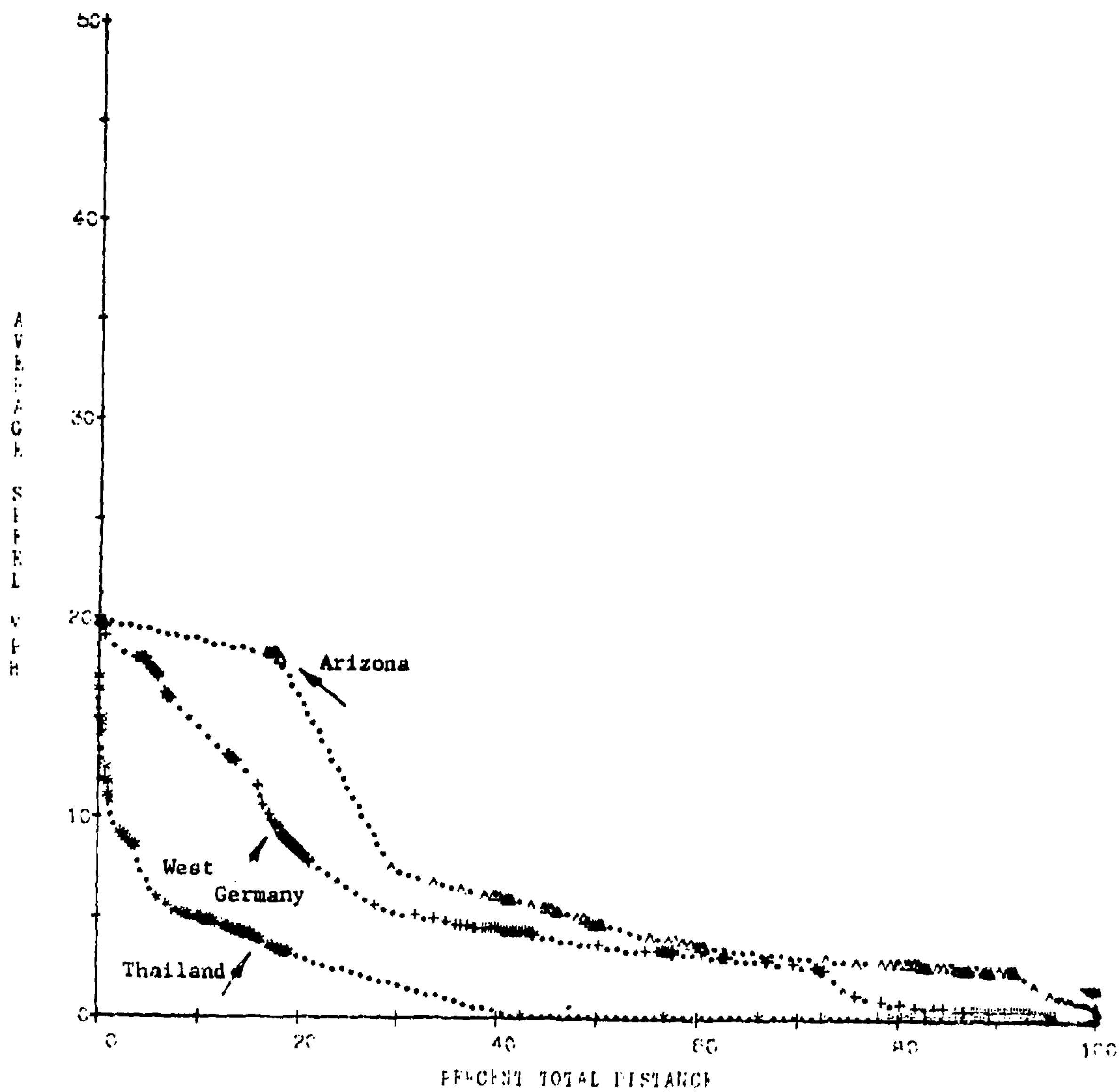


Fig. E43. (43) Off-road mobility profile, 5-ton, 6x4 truck, tractor, (150 in. WB) with M127A1C semitrailer

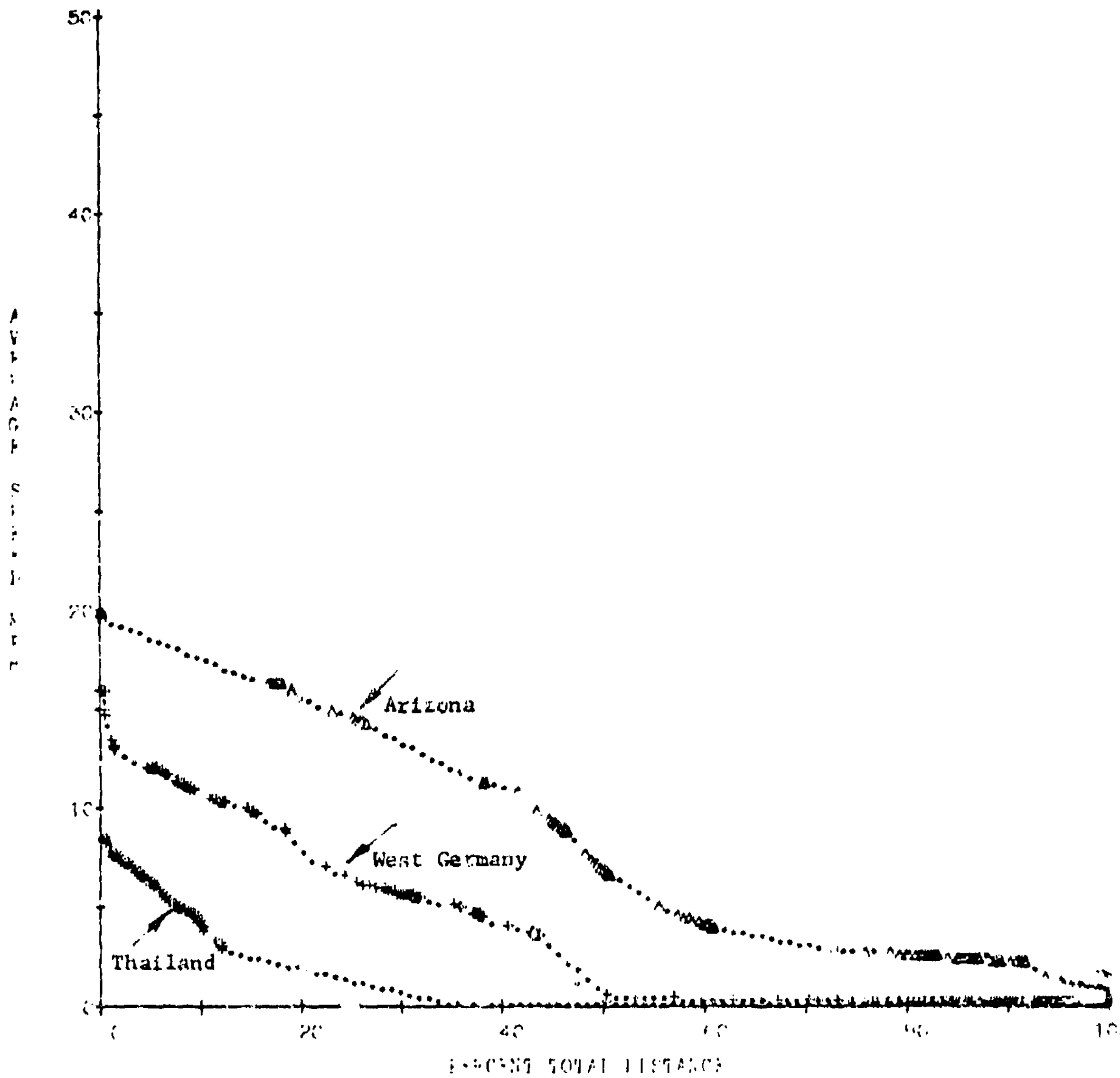


Fig. E44. (44) Off-road mobility profile, M818 5-ton, 6x4 truck, tractor with M127A1C semitrailer

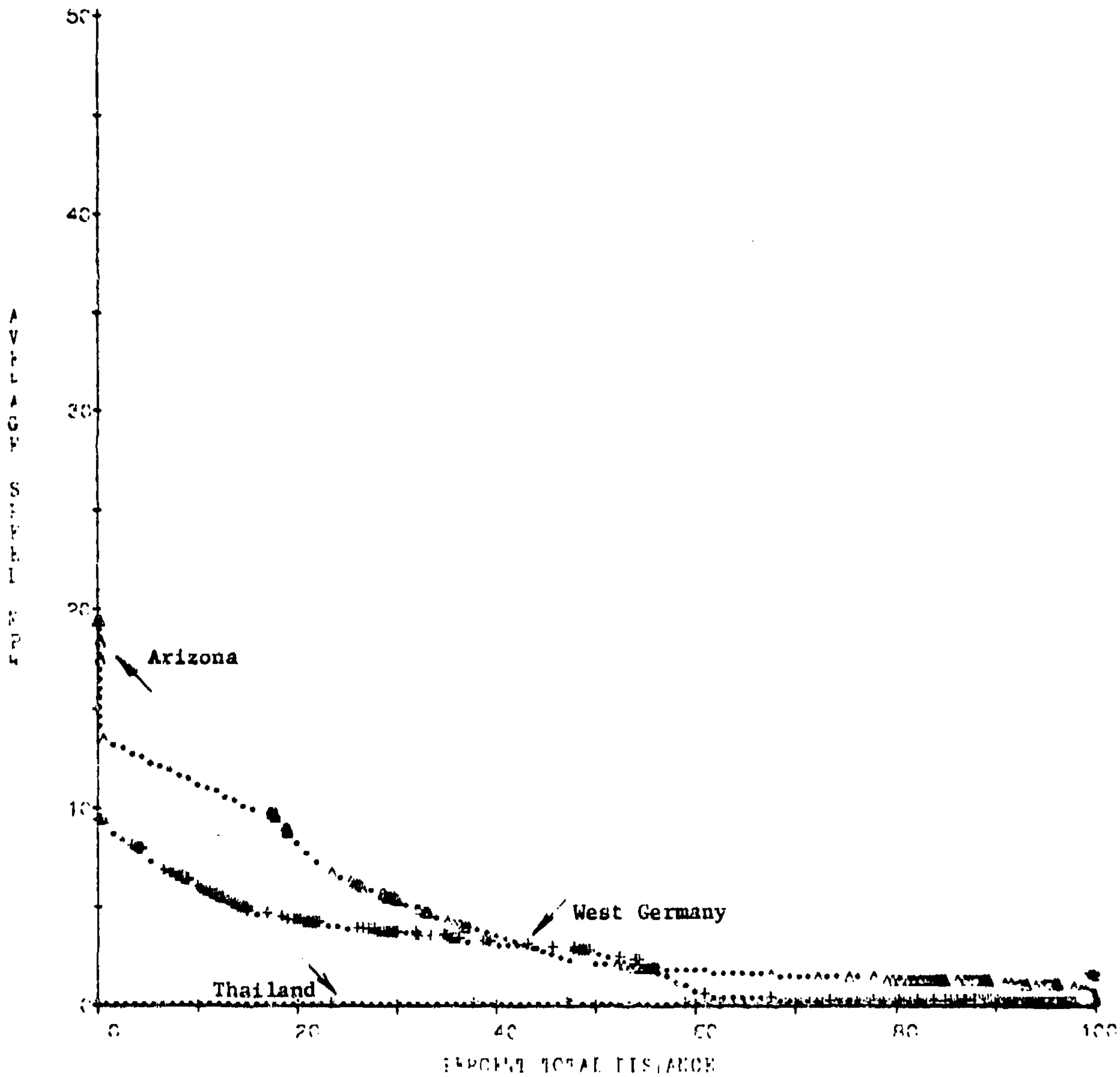


Fig. E45. (45) Off-road mobility profile, M123A1C 10-ton, 6x6 truck, tractor with M172A1 semitrailer

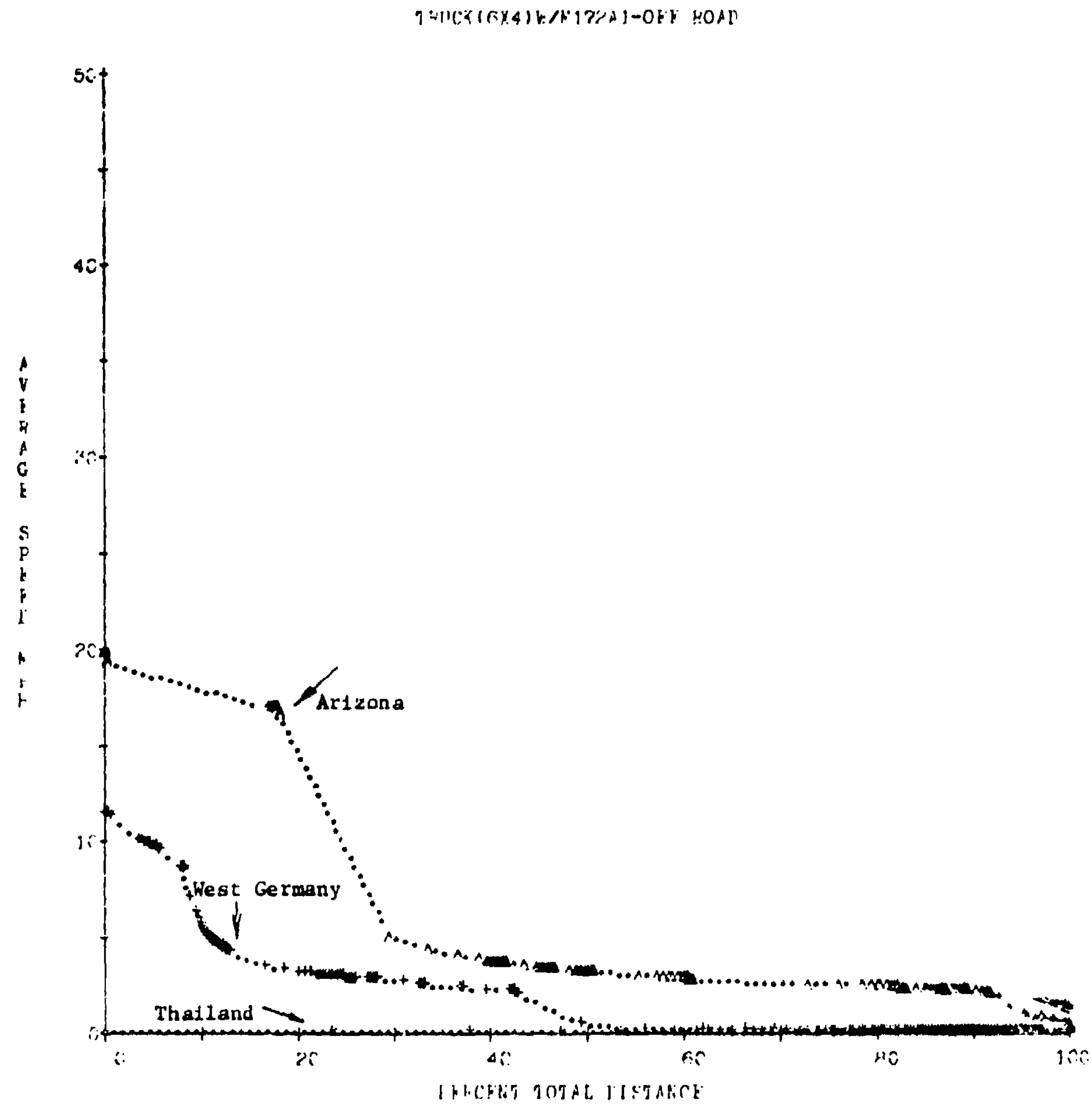


Fig. E46. (46) Off-road mobility profile, 10-ton, 6x4 truck, tractor, (182 in. WB) with M172A1 semitrailer

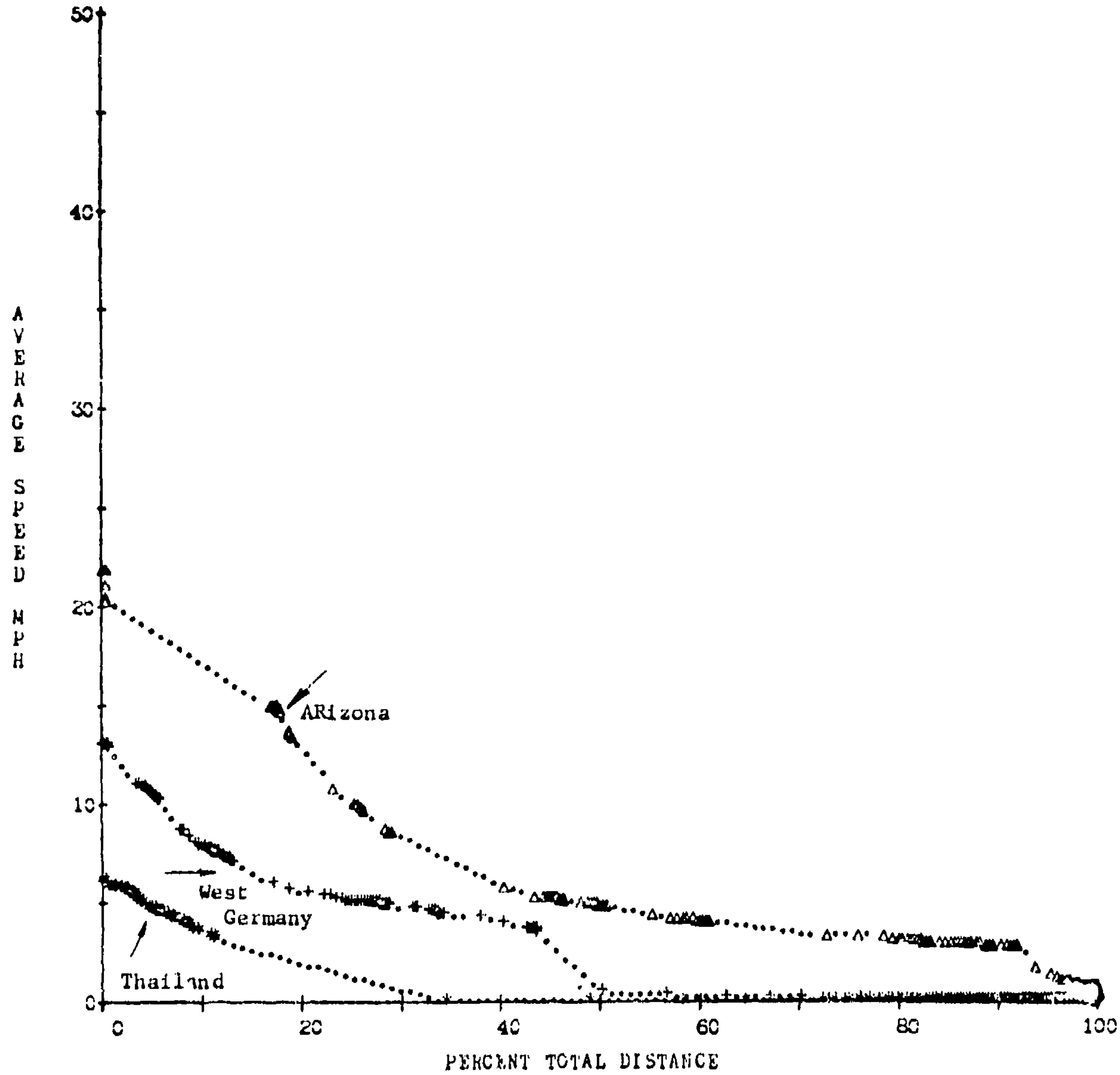


Fig. E47. (47) Off-road mobility profile, XM746 22-1/2-ton, 8x8 truck, tractor with M747 semitrailer

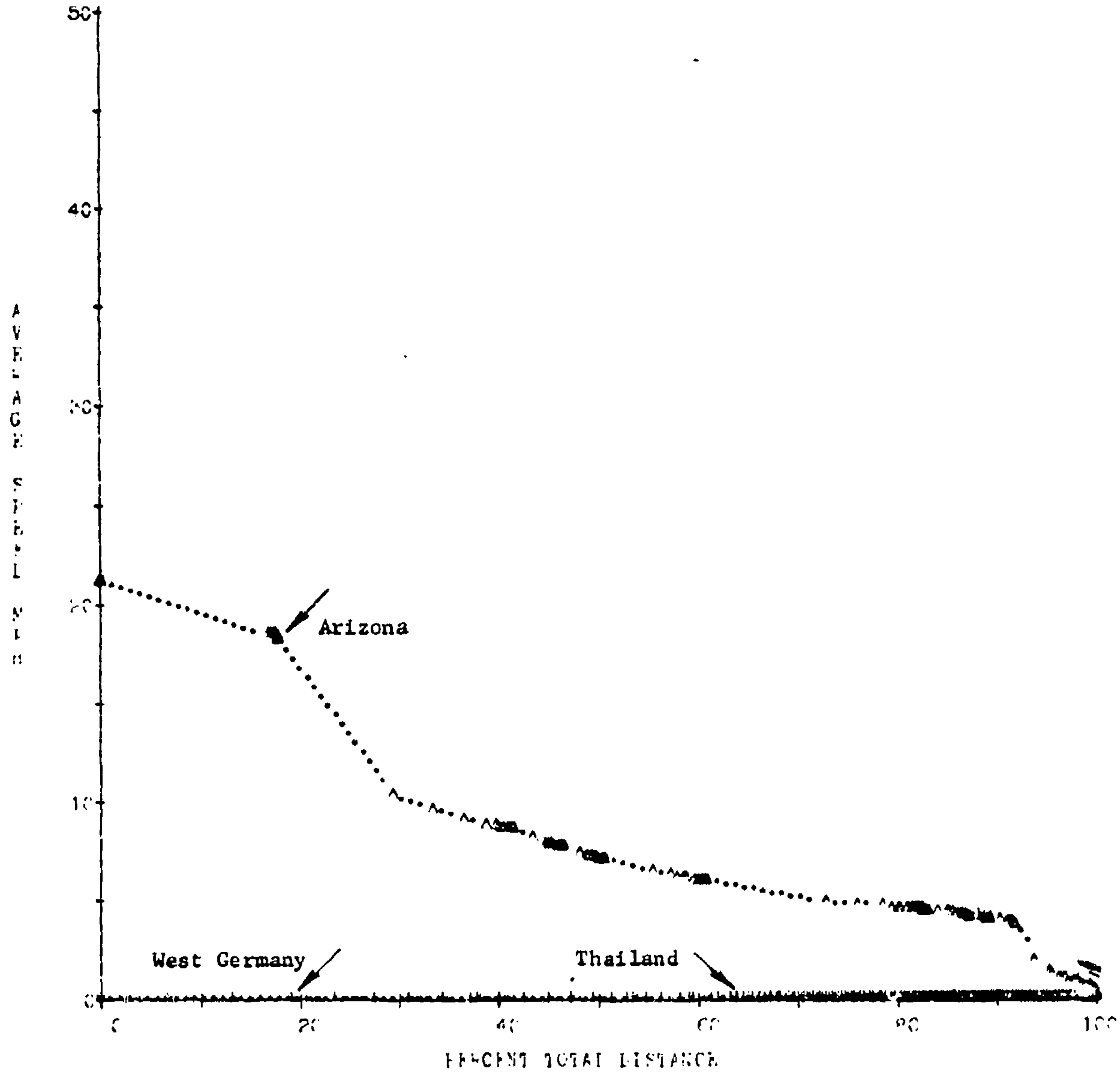


Fig. E48. (48) Off-road mobility profile, 22-1/2-ton, 8x4 truck, tractor with M747 semitrailer

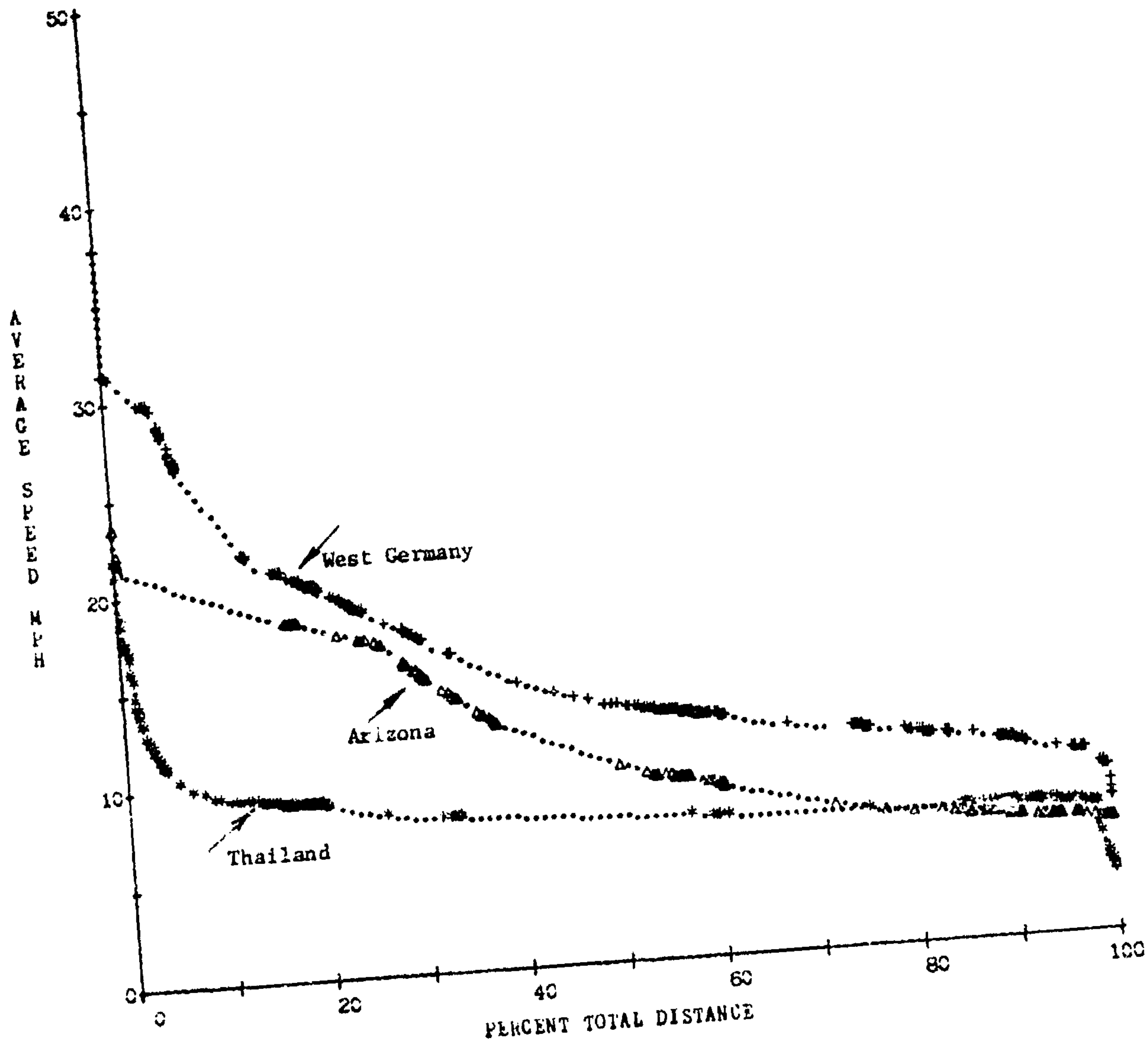


Fig. E49. (49) Off-road mobility profile, M113A1 full-tracked, armored carrier, personnel

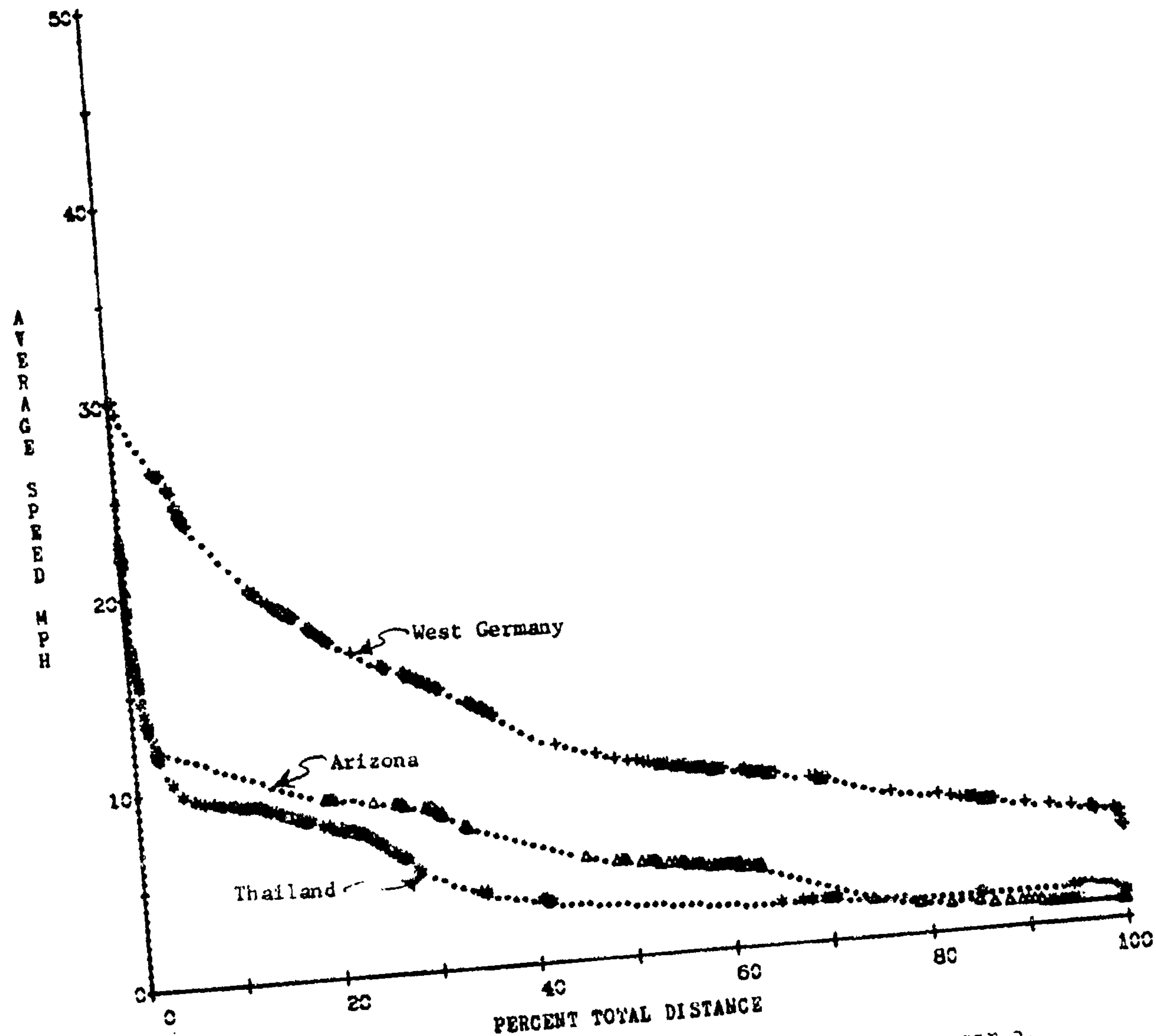


Fig. E50. (50) Off-road mobility profile. 5[illegible] carrier, car [illegible], full-tracked

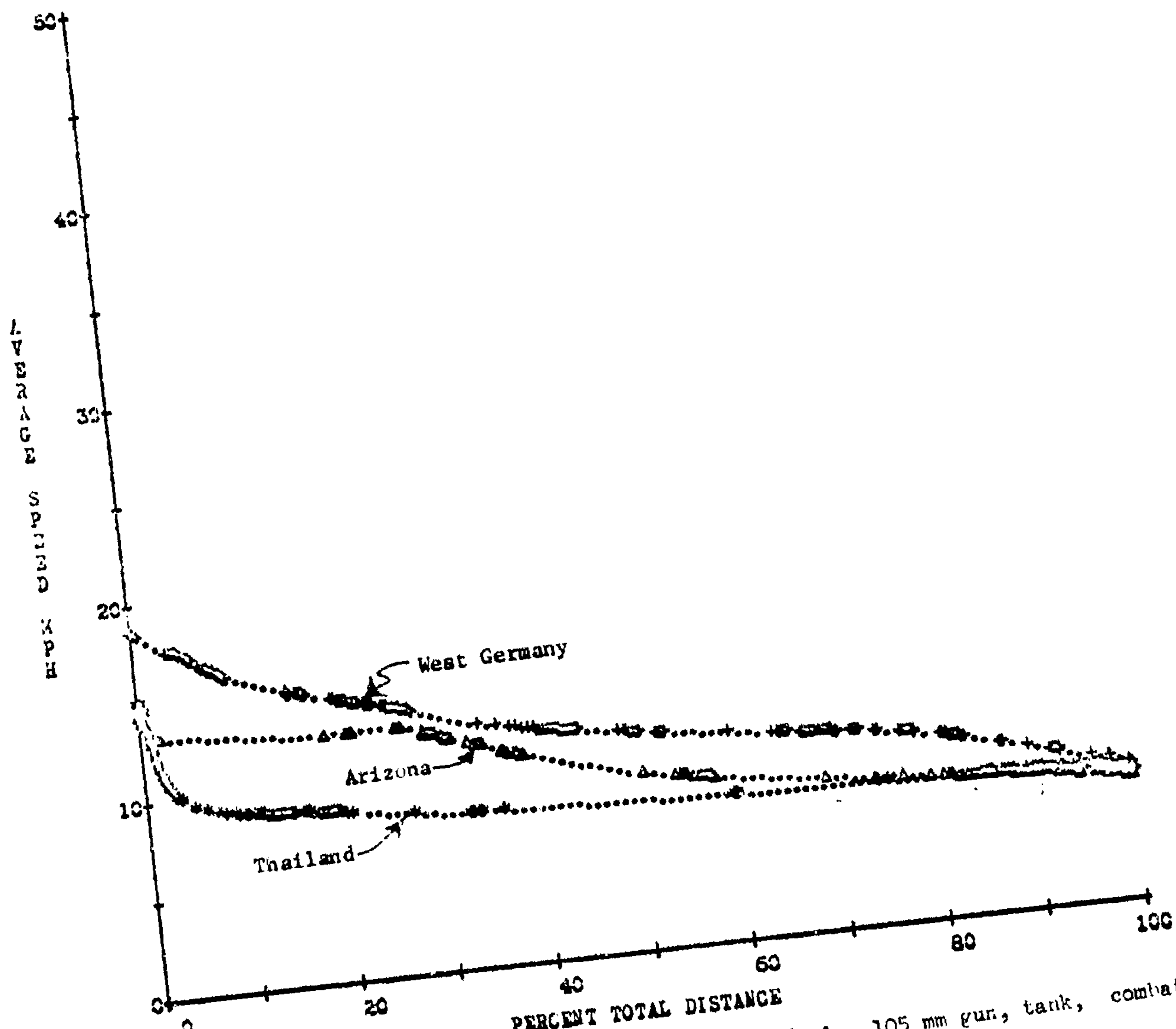


Fig. E51. (51) Off-road mobility profile, M60A1 105 mm gun, tank, combat, full-tracked

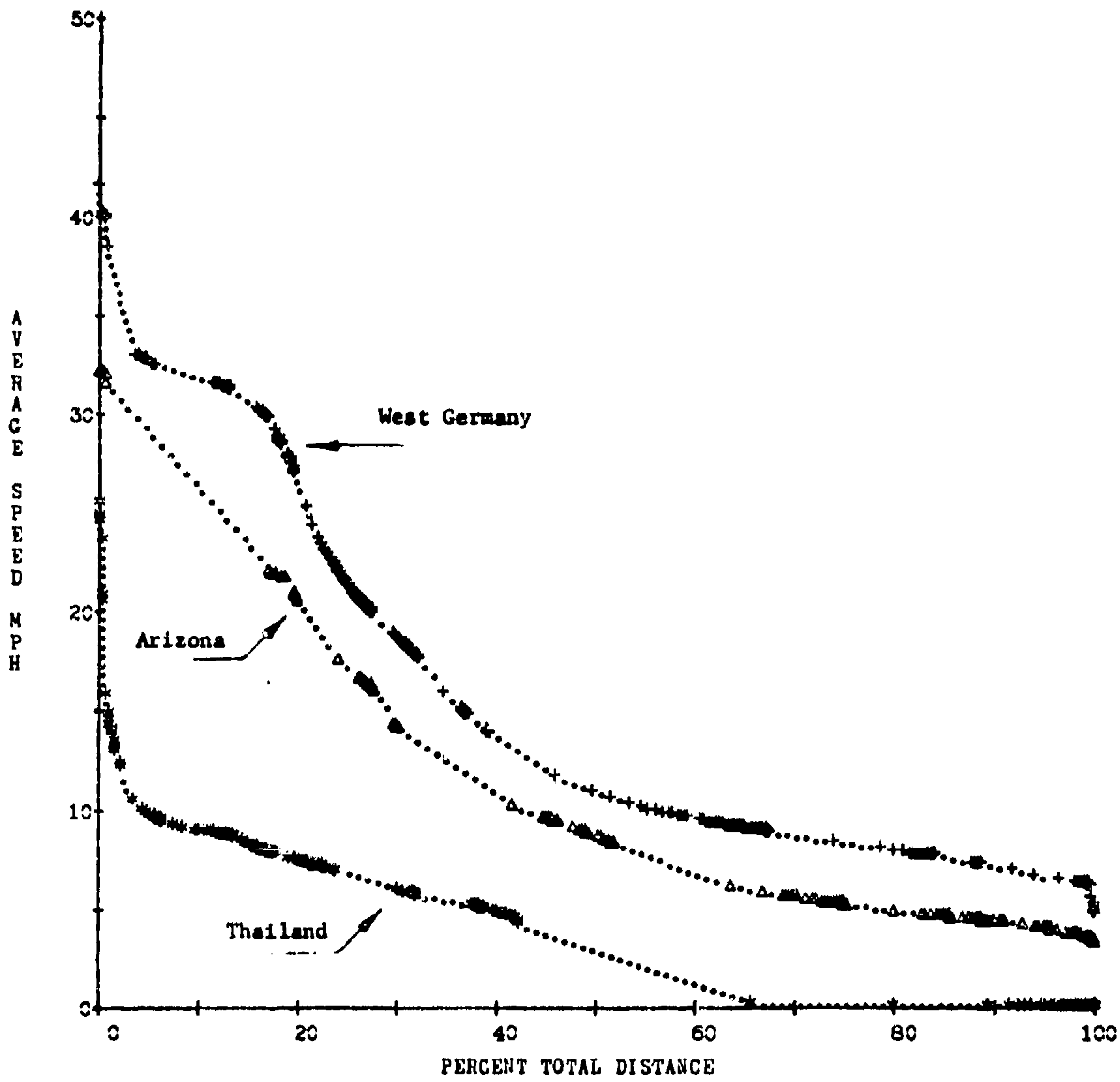
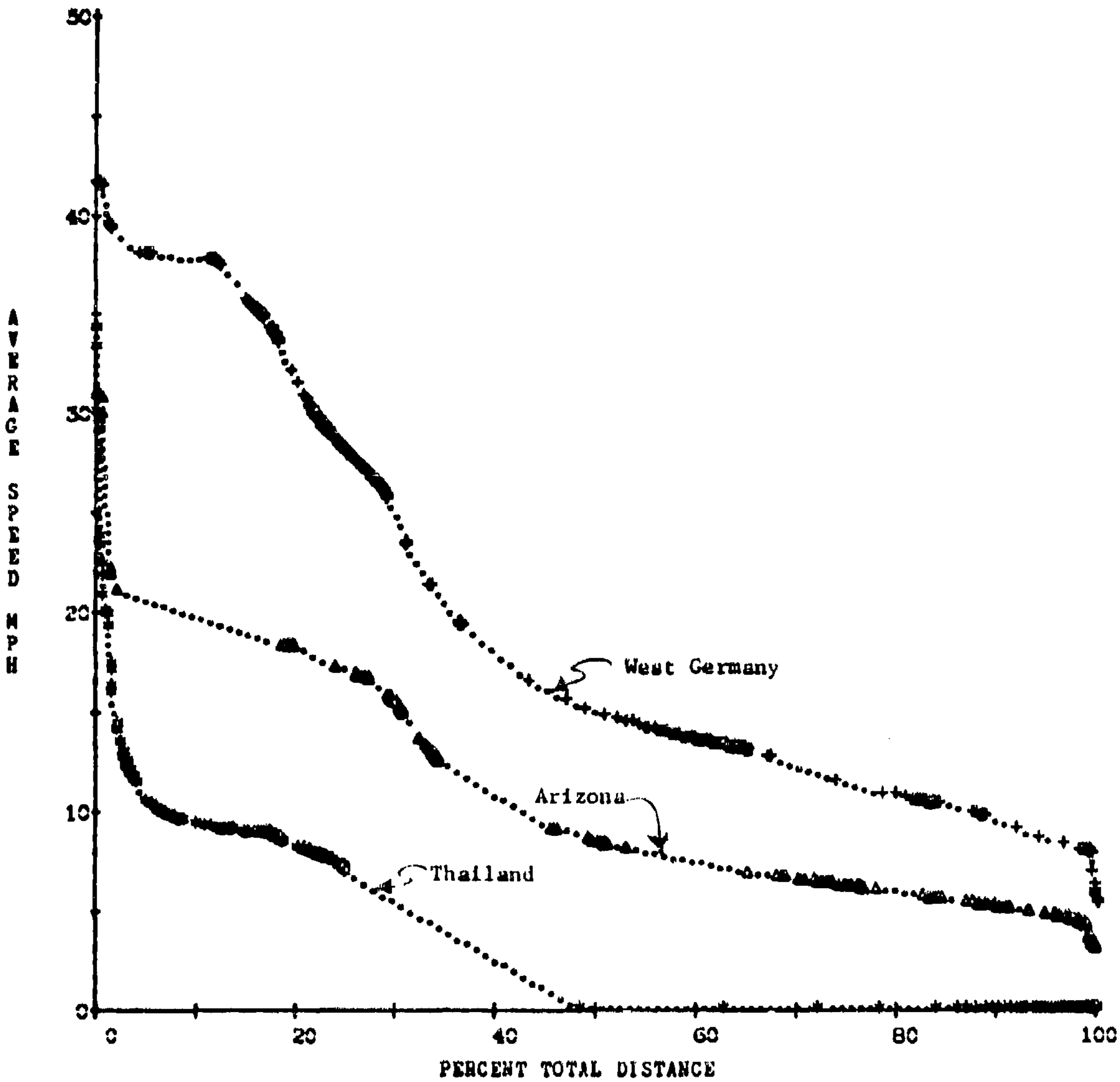


Fig. E52. Off-road mobility profile, M38A1 1/4-ton, 4x4 truck, utility



Fi[illegible] (53) Off-road mobilit[illegible] profile, M[illegible] [illegible]-ton, [illegible]x[illegible] truck, [illegible]

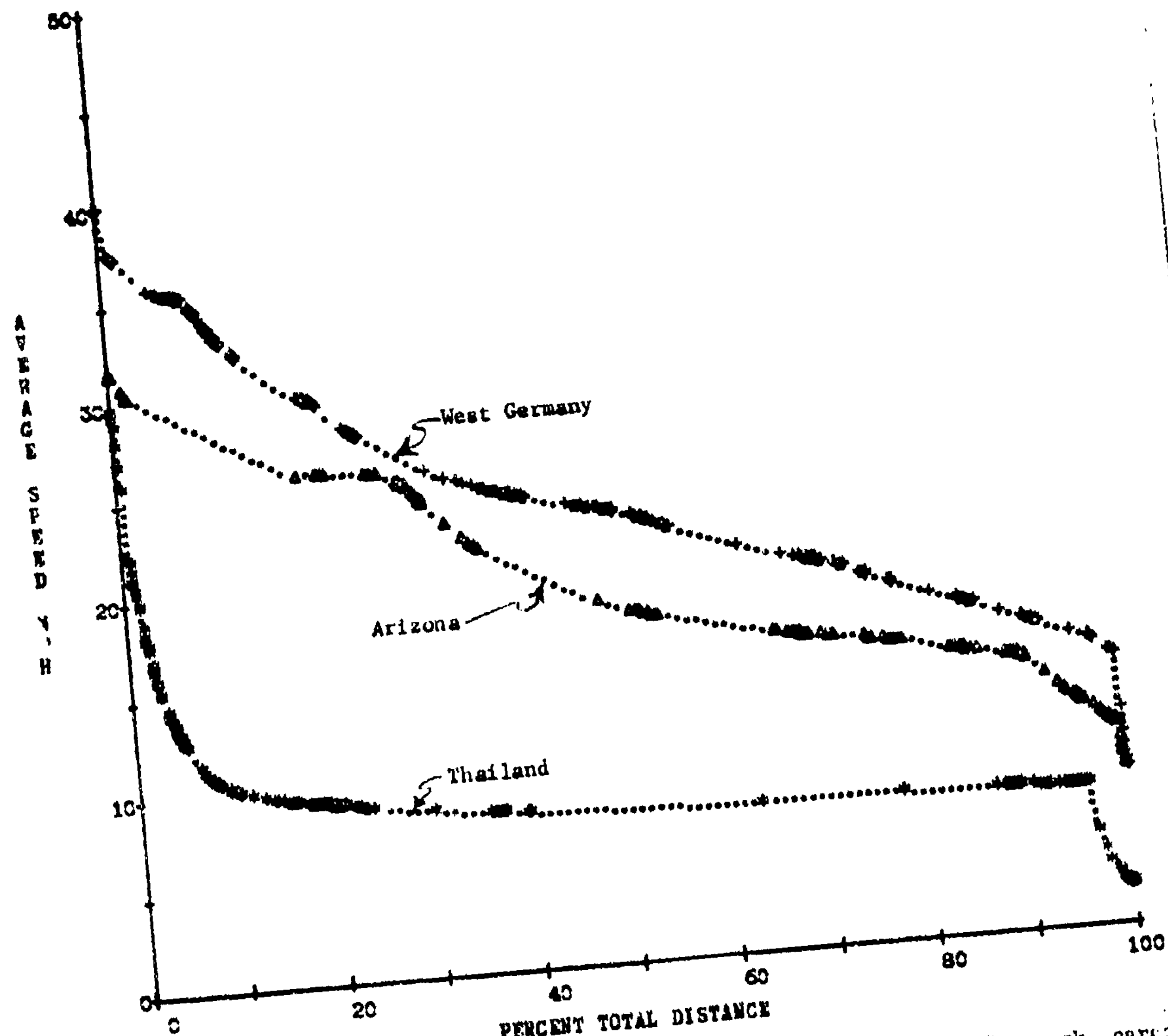


Fig. E51. (54) Off-road mobility profile, XM410 2-1/2-ton, 8x8 truck, cargo

APPENDIX F: FACTORS CONTROLLING SPEED

A complete speed output for a given vehicle includes the percentage of traverse distance at which each of 10 factors causes immobilizations or controlled speed. In fig. F1, this information is presented in the form of histograms for each vehicle in the off-road areal terrains in each traverse. (The vehicles are presented in the same order as listed in table 9.) The percentage of traverse distance is plotted against each of the 10 controlling factors, identified by numbers, as follows:

Controlling Factor No.	Description
	Factors Causing Immobilization
1	Surface strength less than minimum required for one pass
2	Available traction less than total of surface and slope resistances
3	Obstacle interference
4	Available traction less than total of surface, slope, obstacle, and vegetation resistances
	Factors Controlling Speed
5	Ride dynamics
6	Total of surface and slope resistances
7	Visibility
8	Maneuvering
9	Total of surface, slope, obstacle and vegetation resistances
10	Acceleration and deceleration between obstacles

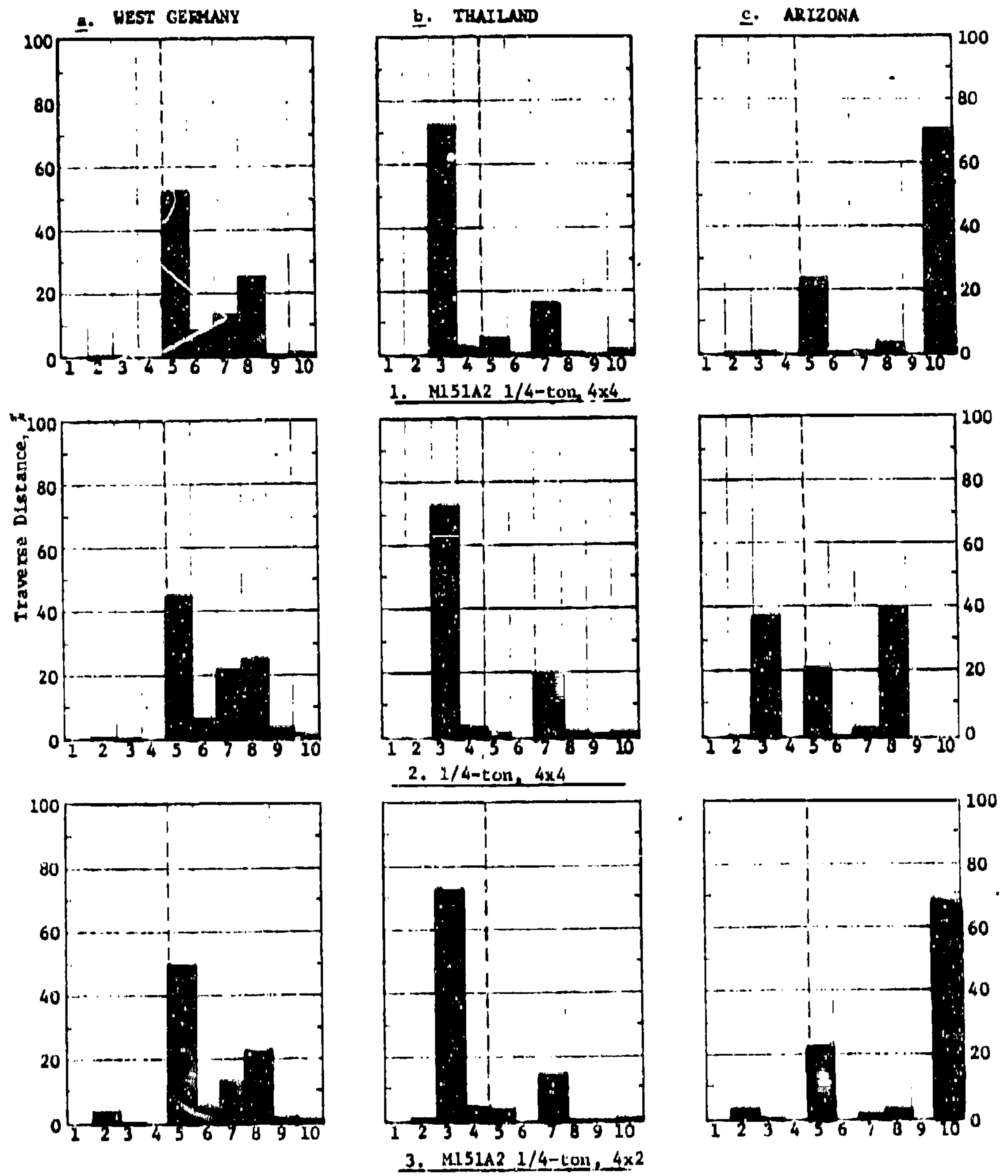


Fig. F1. Factors controlling speed
(sheet 1 of 18)

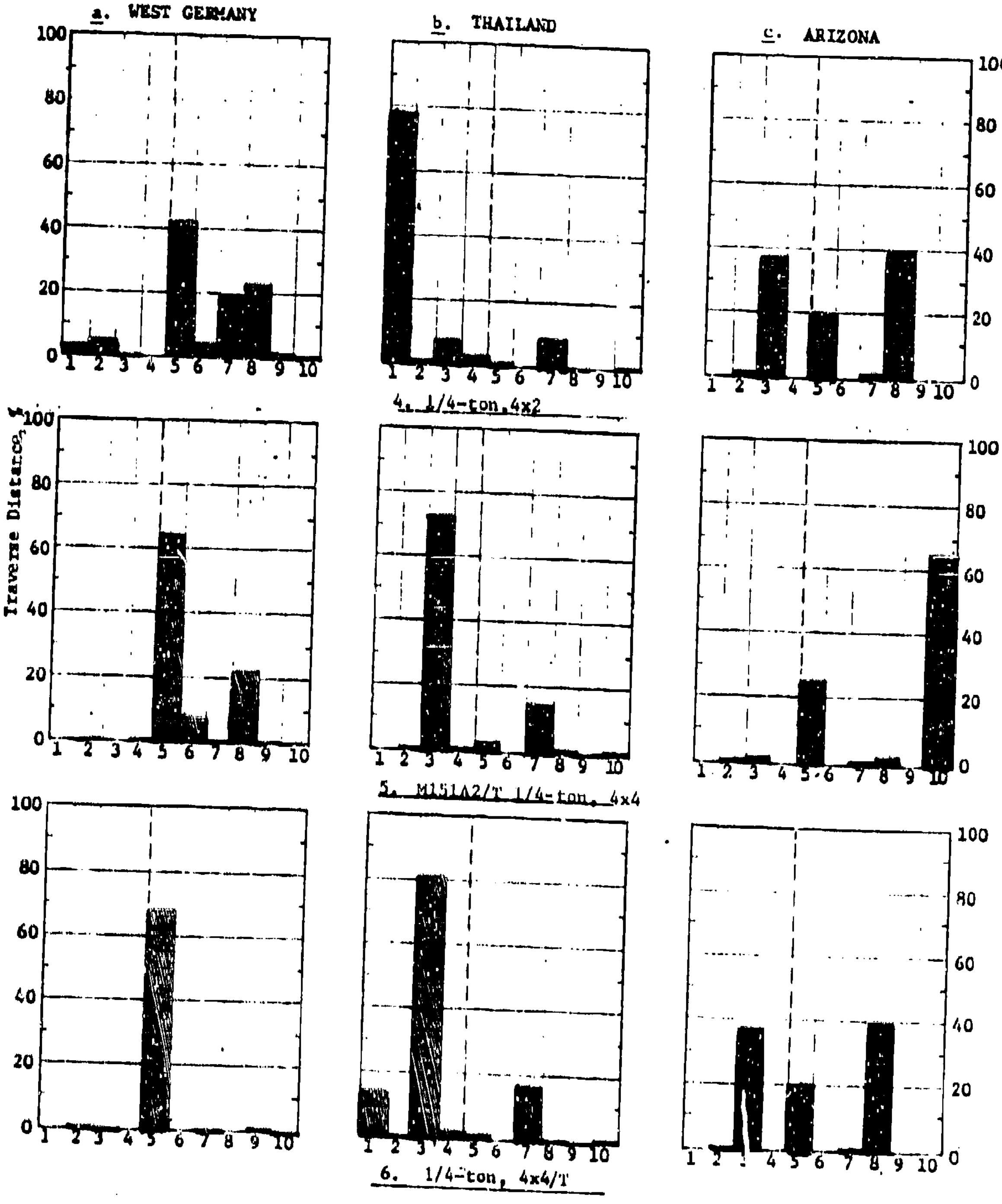


Fig.F1. (sheet 2 of 18)

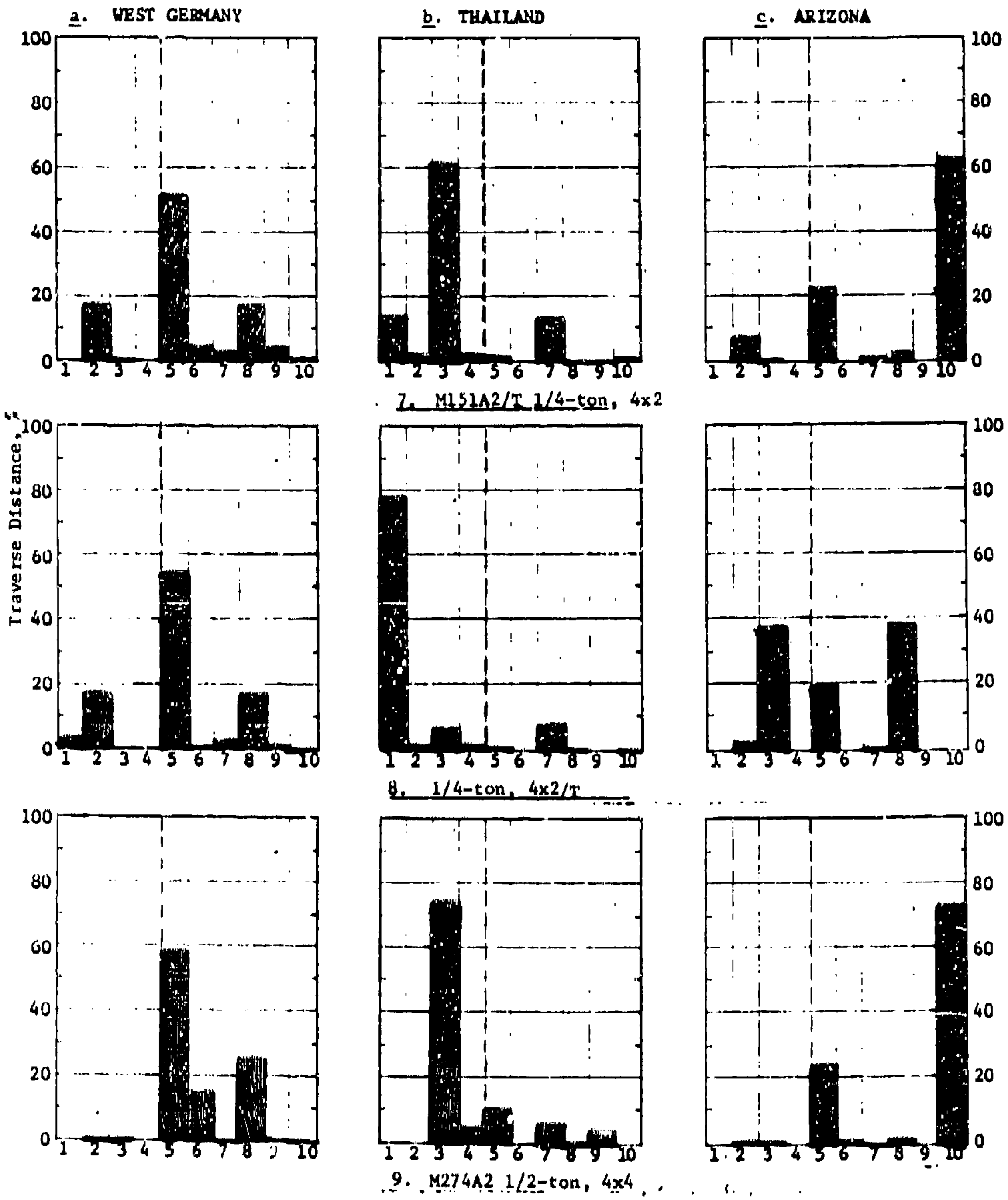
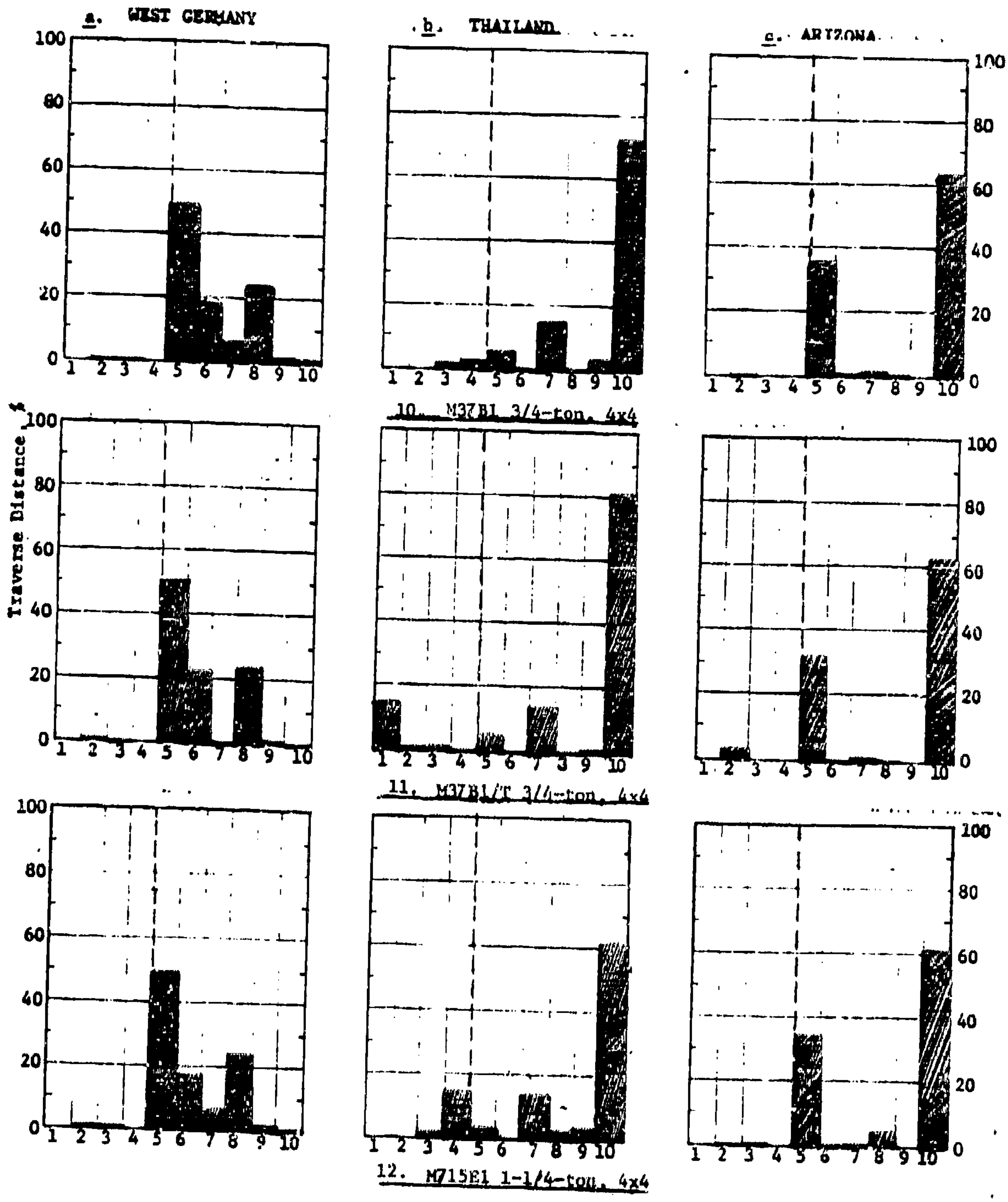


Fig. F1. (sheet 3 of 18)



271<

Fig. F1. (Sheet 4 of 18)

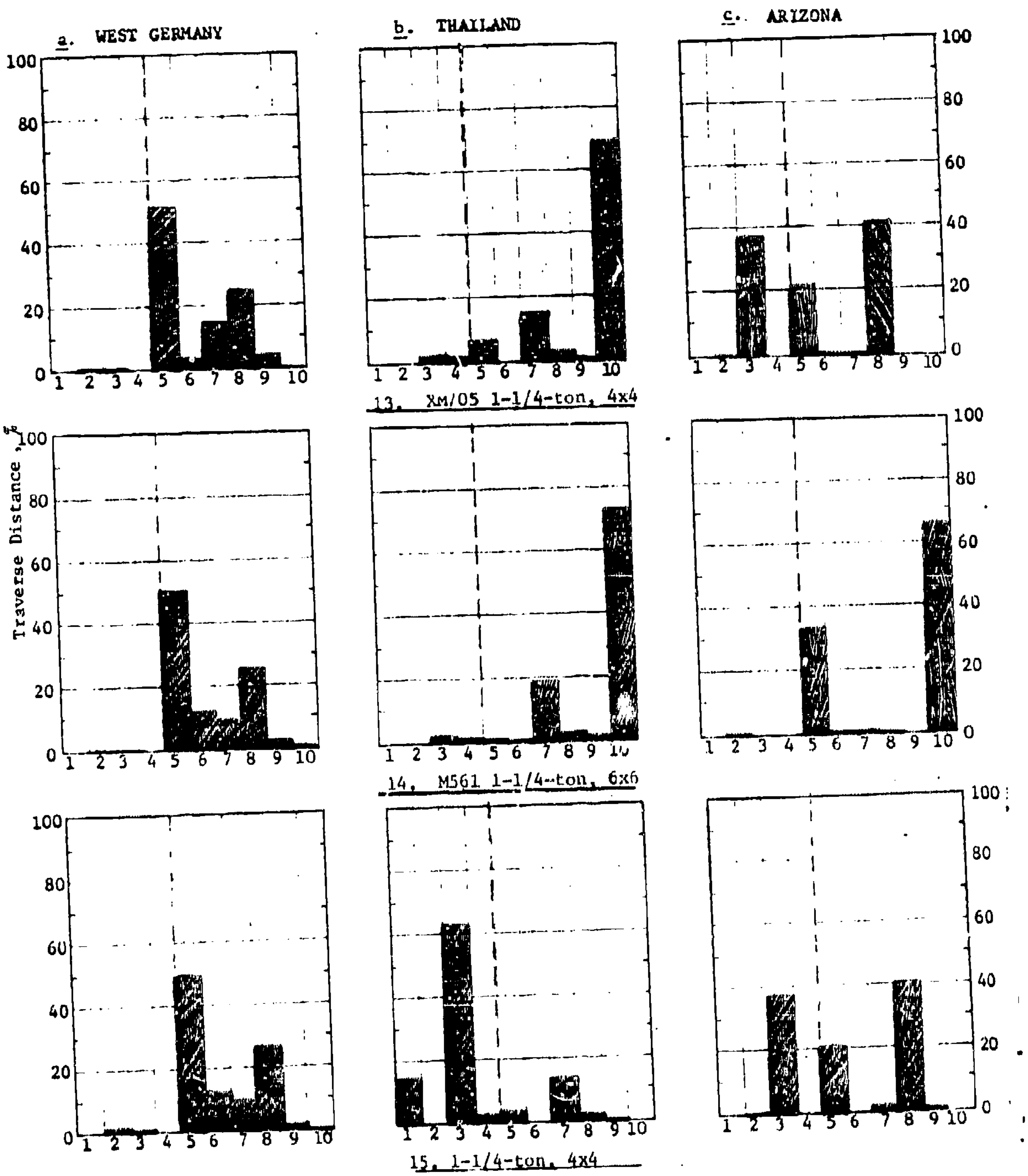


Fig. F1. (sheet 5 of 18)

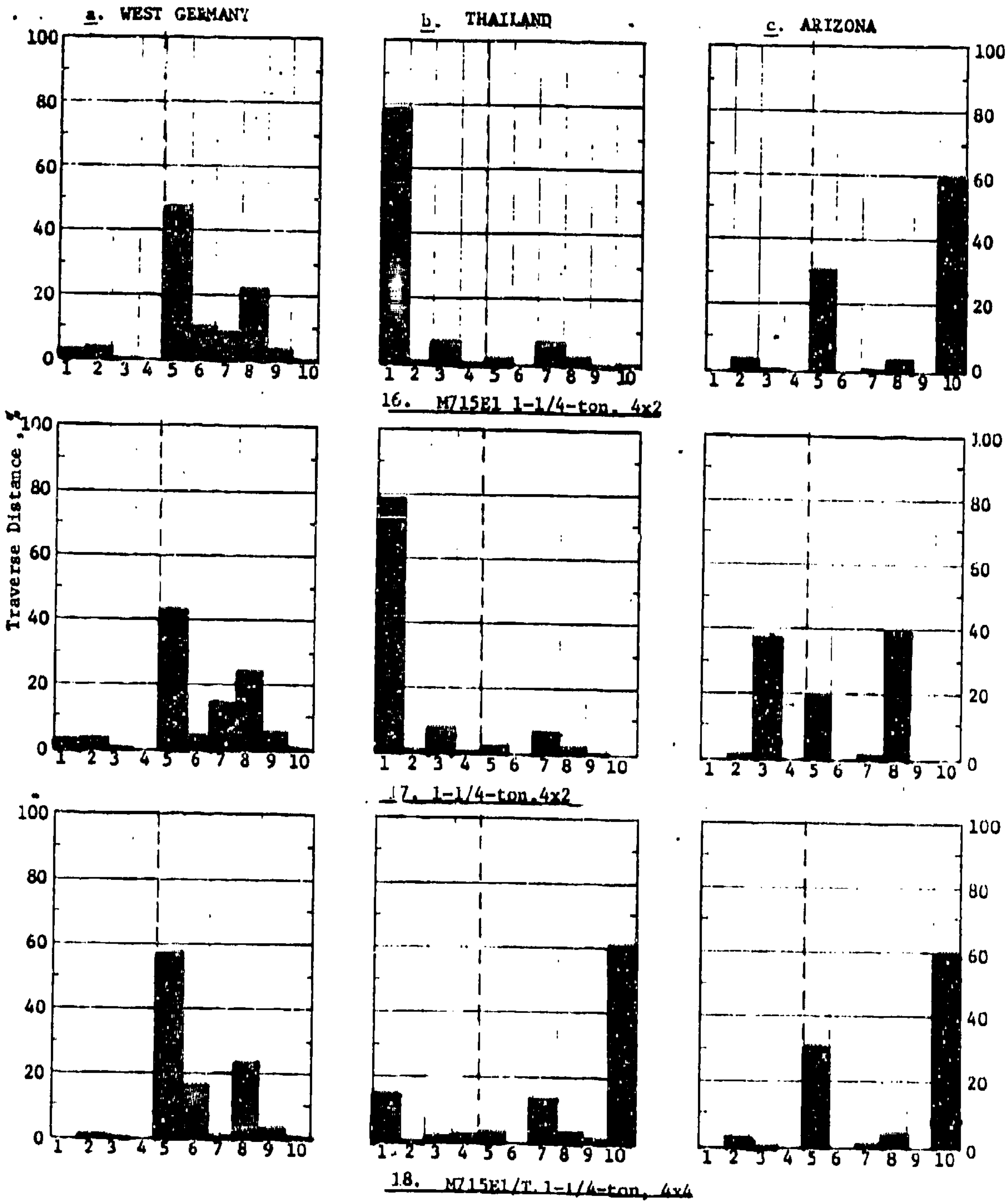


Fig. F1. (sheet 6 of 18)

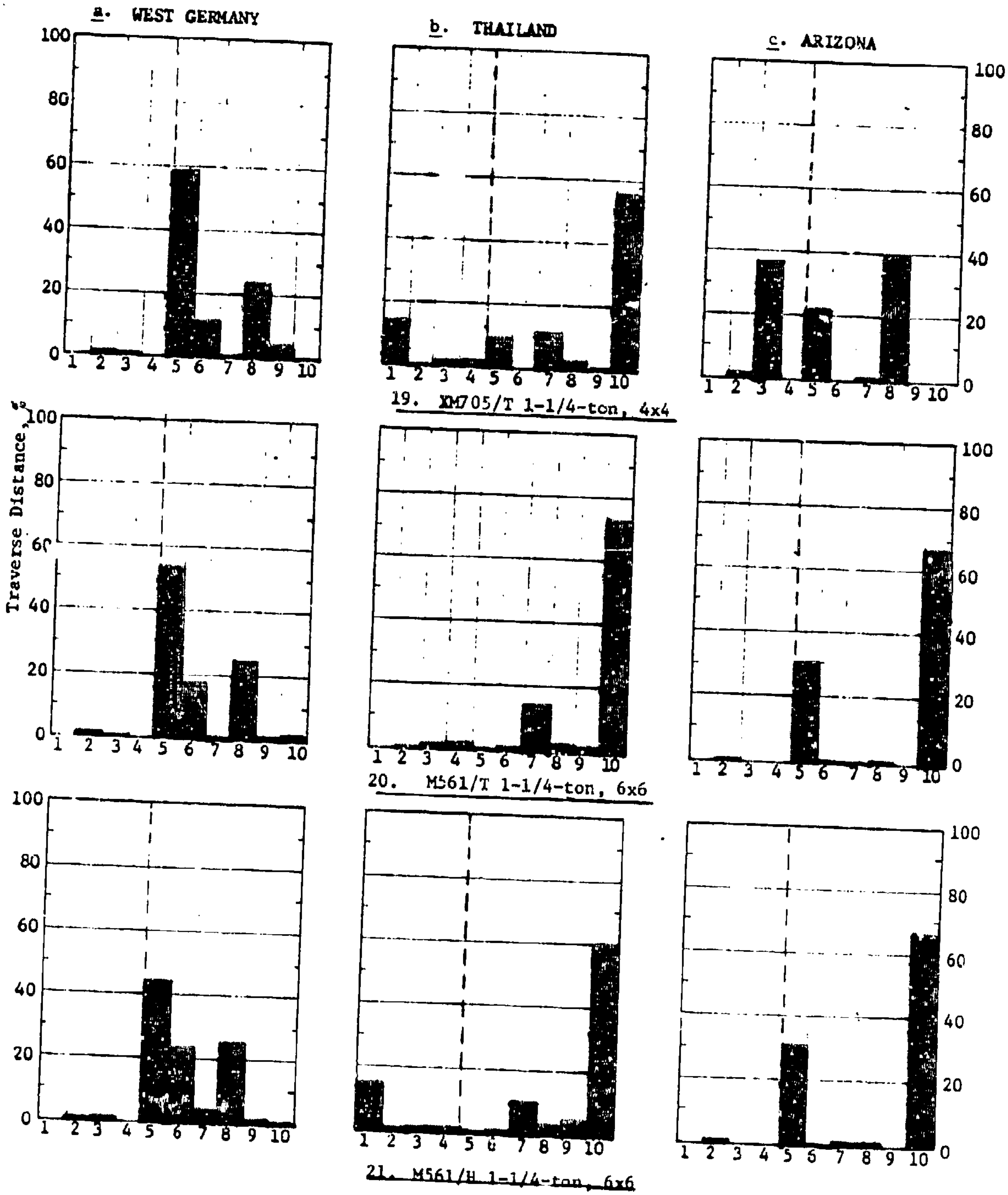
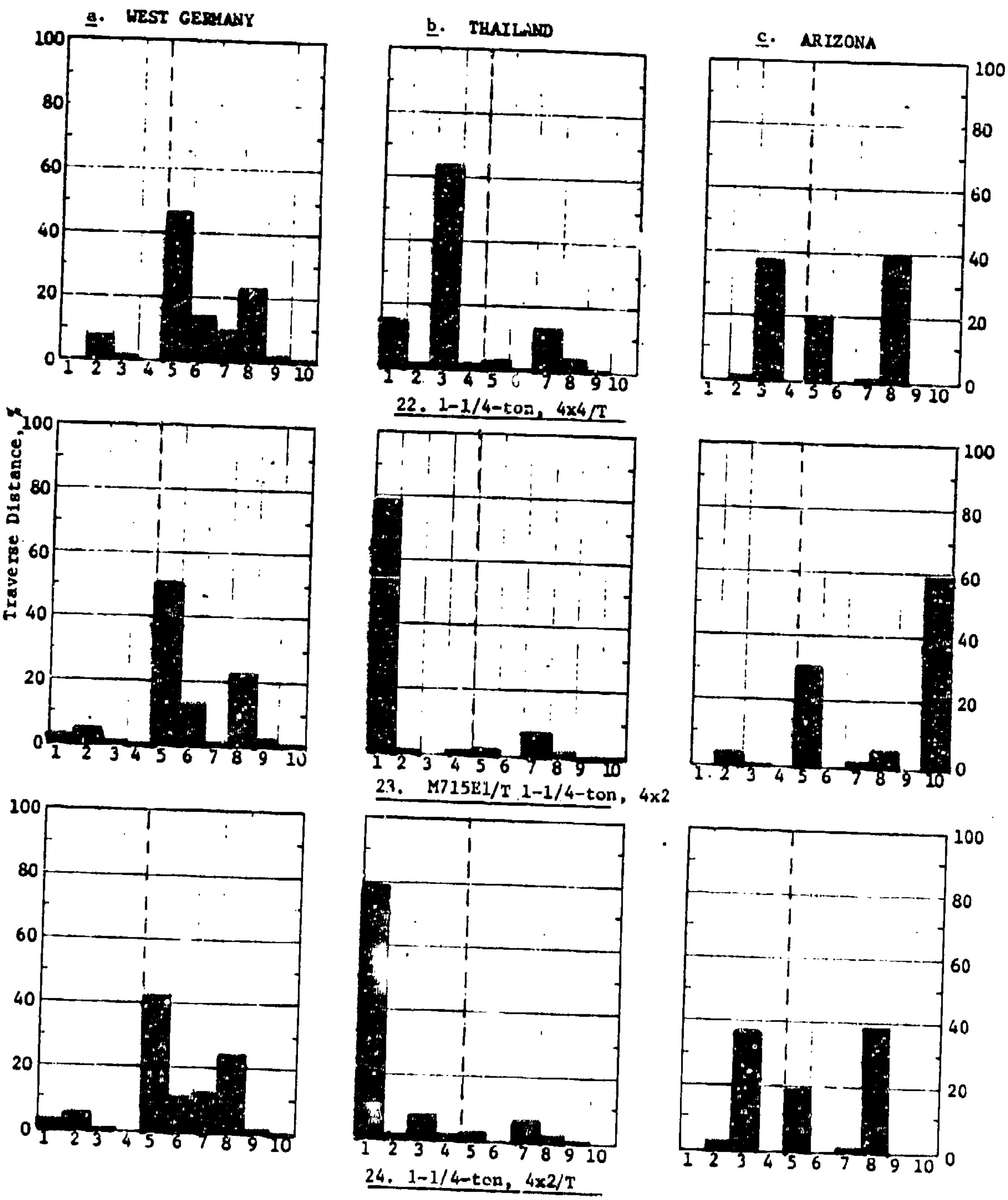


Fig. F1 (sheet 7 of 18)



275<

Fig. F1. (sheet 8 of18)

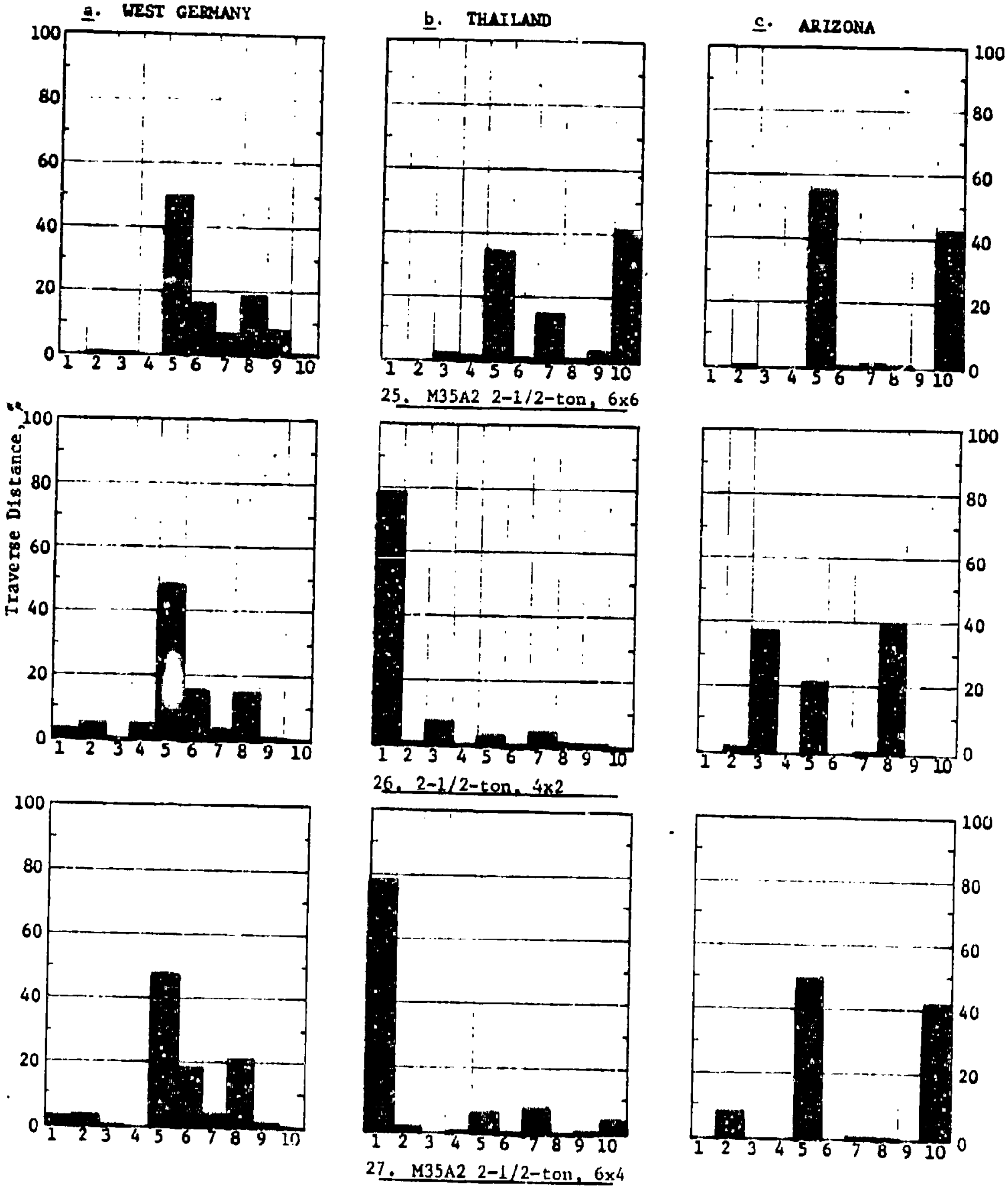


Fig. F1. (sheet 9 of 18)

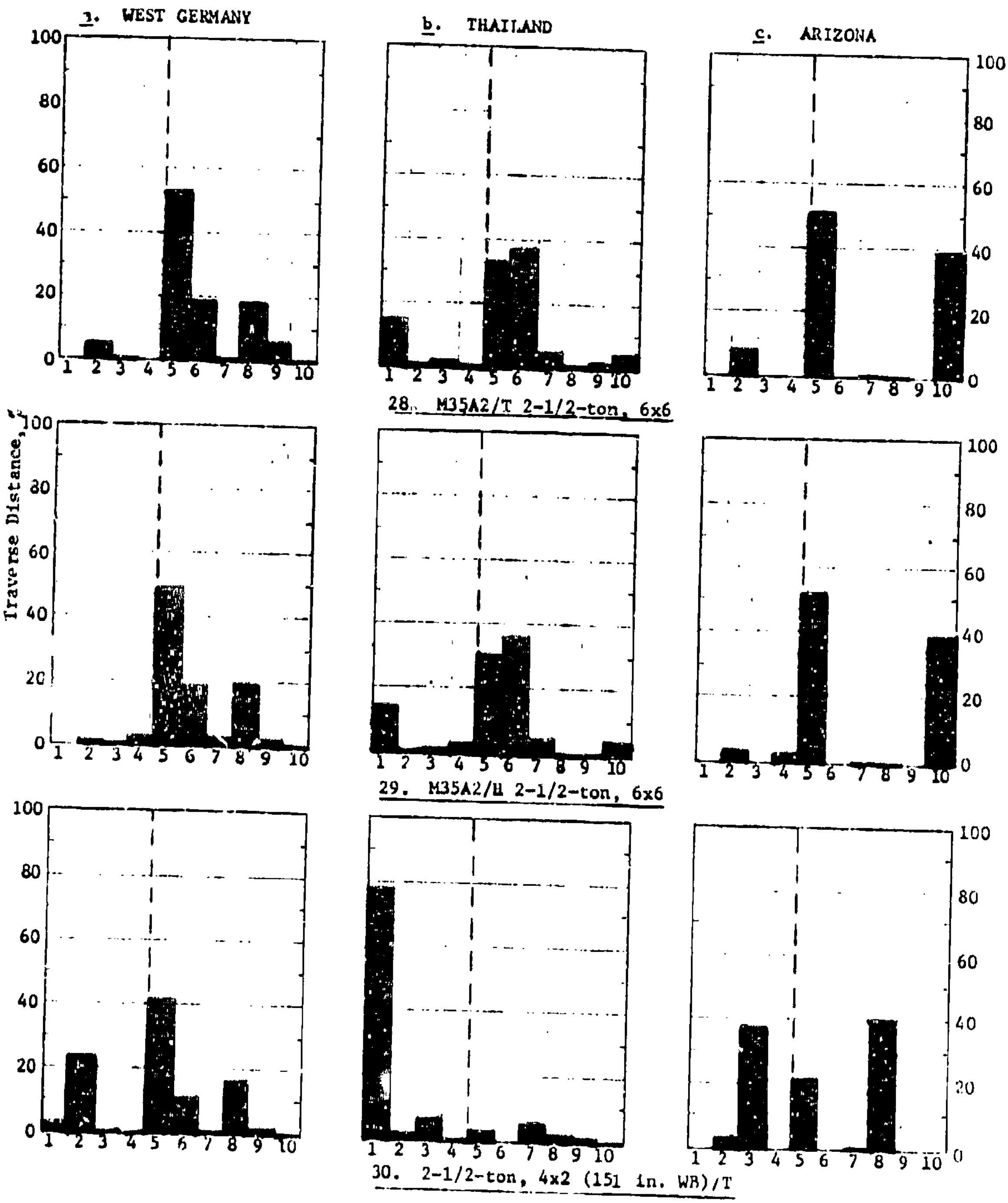
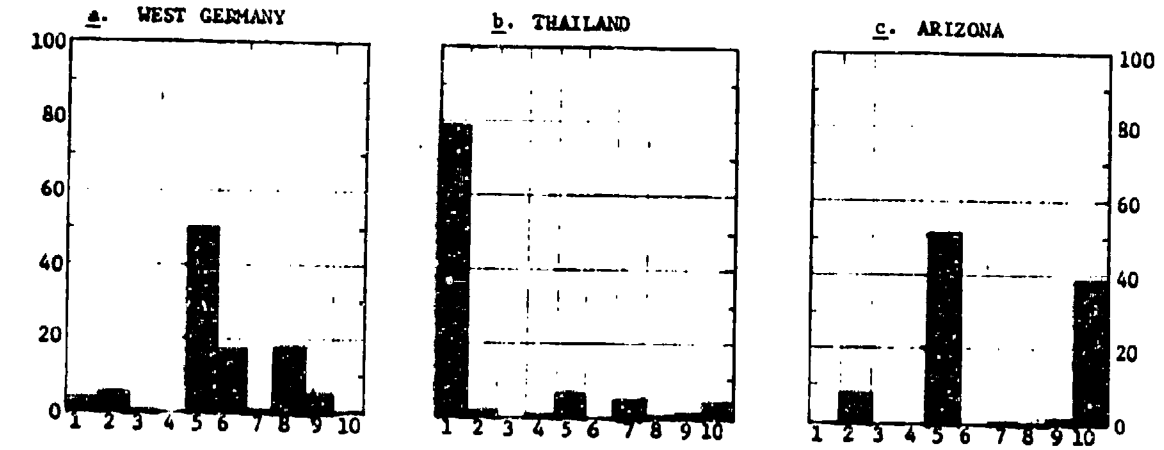
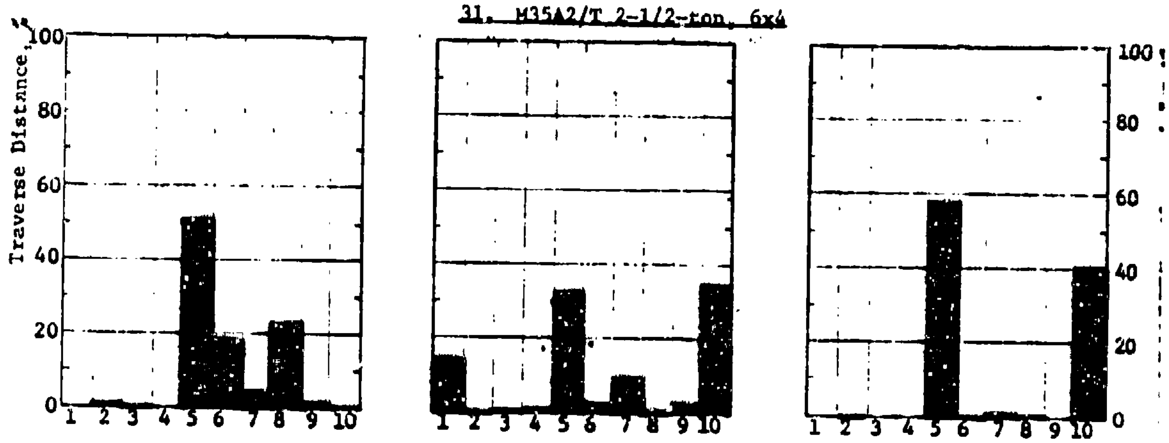


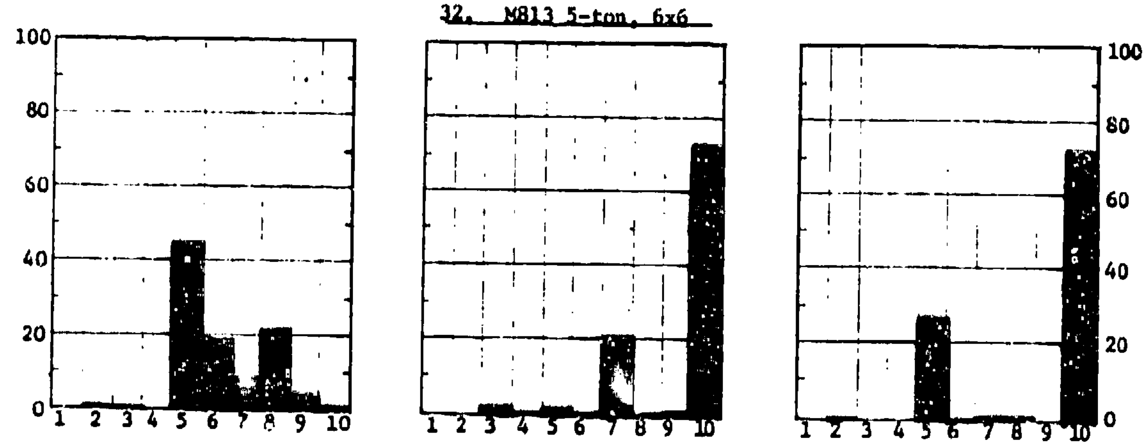
Fig F1. (sheet 10 of 18)



31. M35A2/T 2-1/2-ton, 6x4

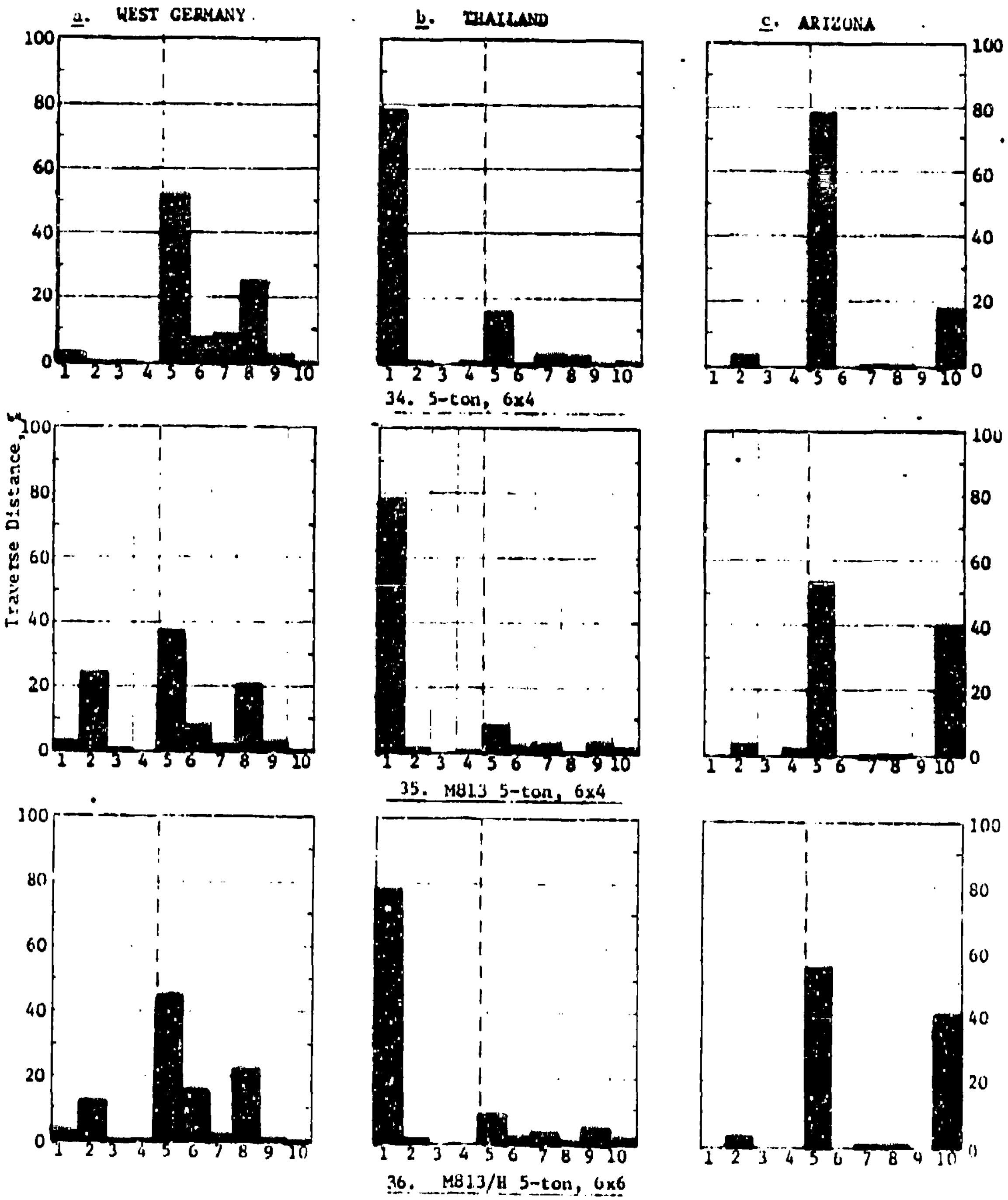


32. M813 5-ton, 6x6



33. M656 5-ton, 8x8

Fig F1. (sheet 11 of 18)



279<

Fig. F1. (sheet 12 of 18)

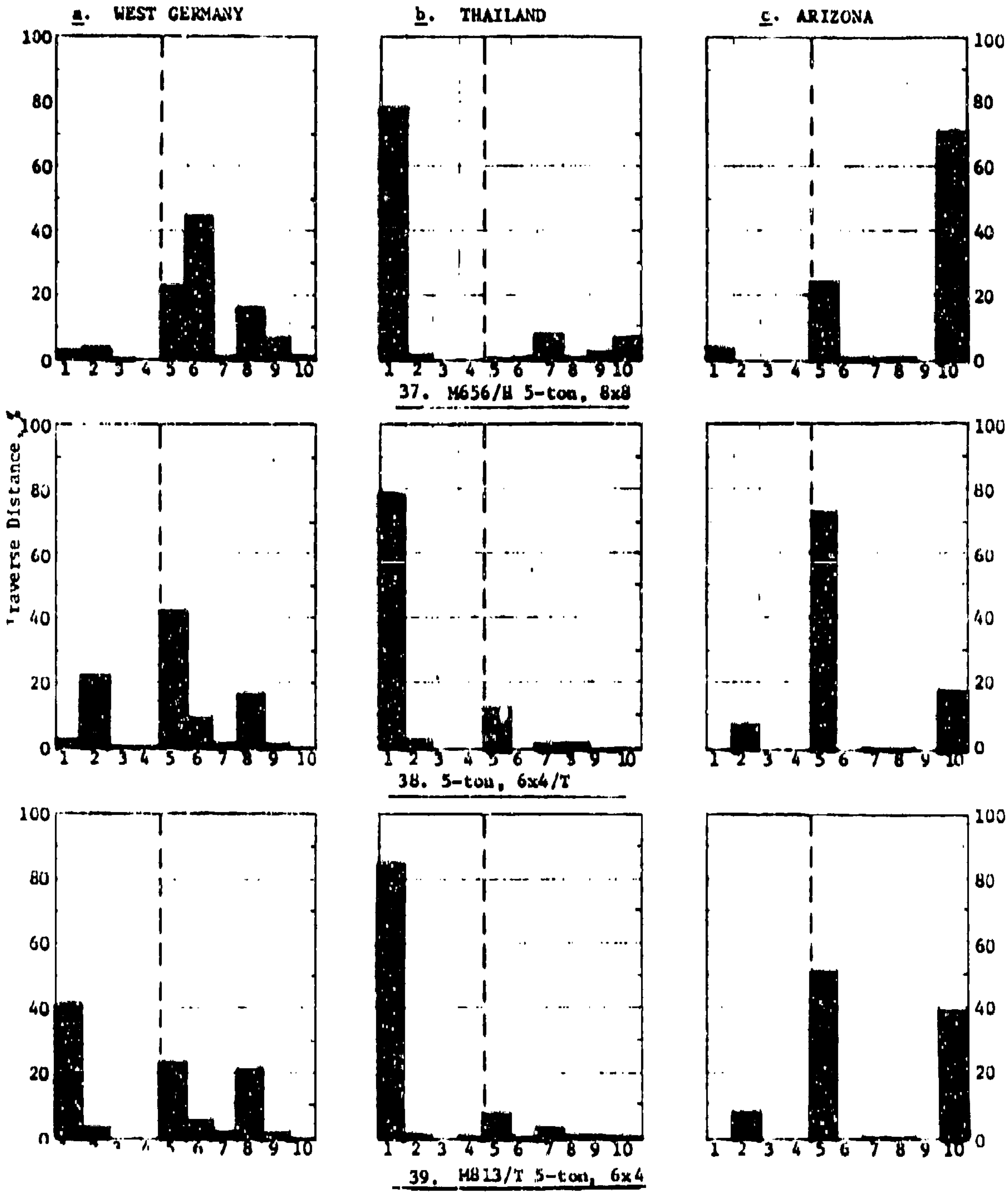


Fig.F1. (sheet 13 of 18)

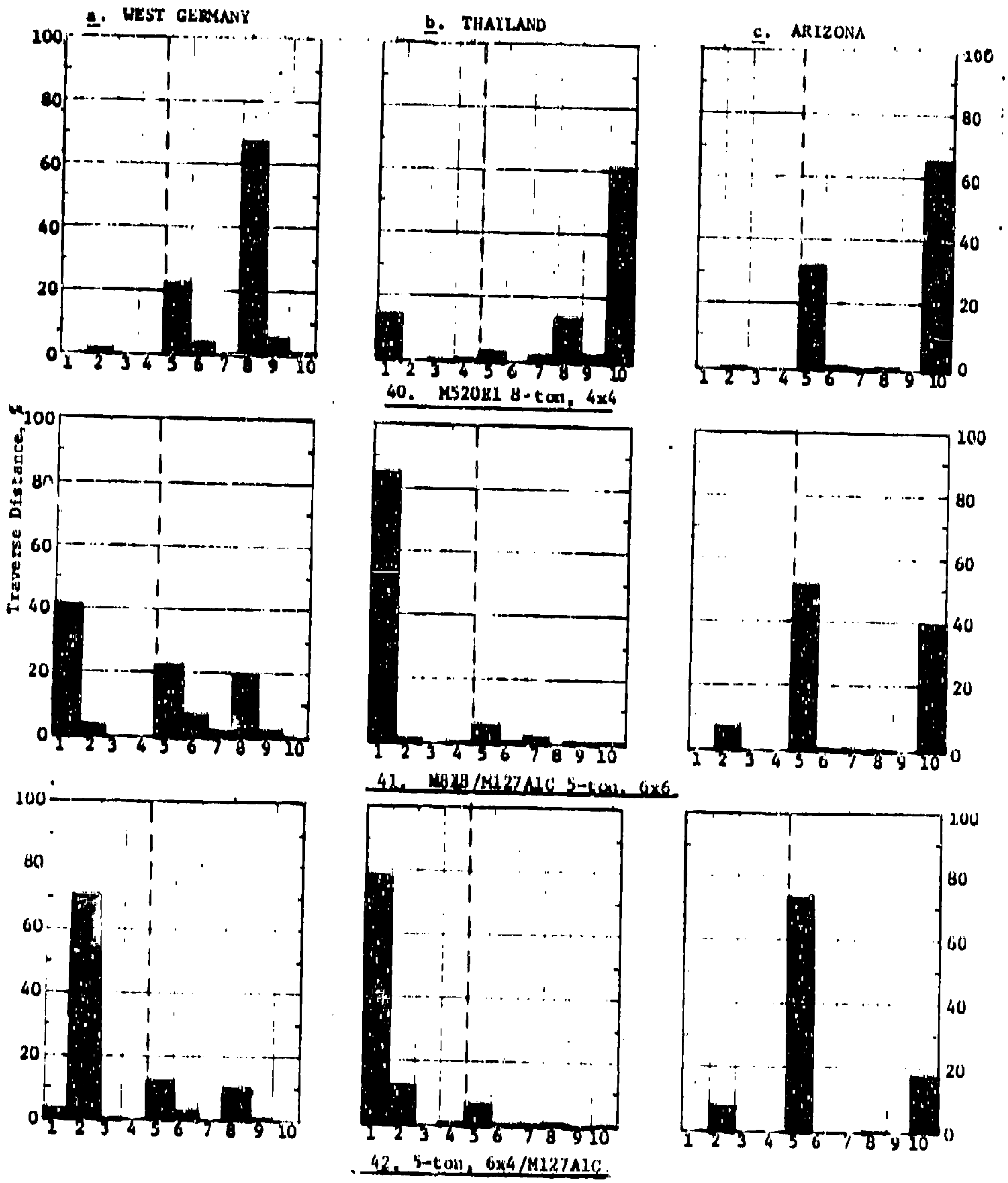
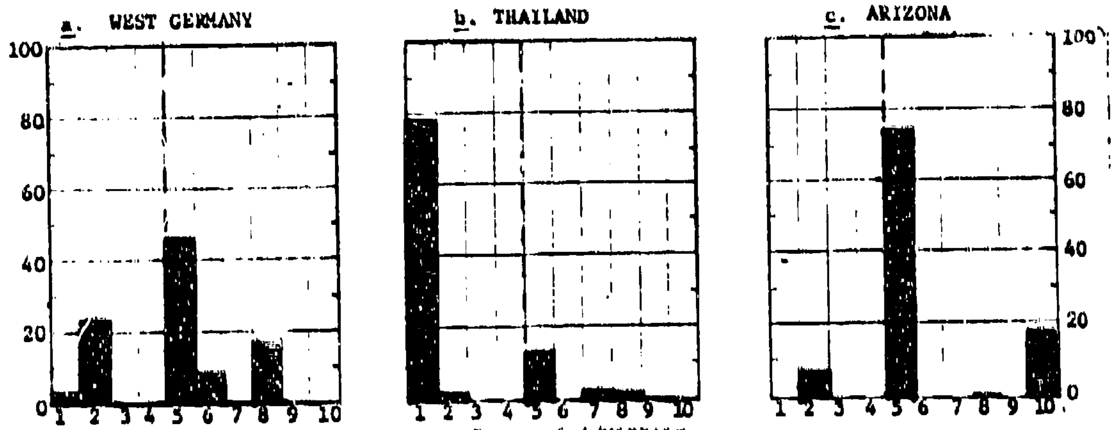
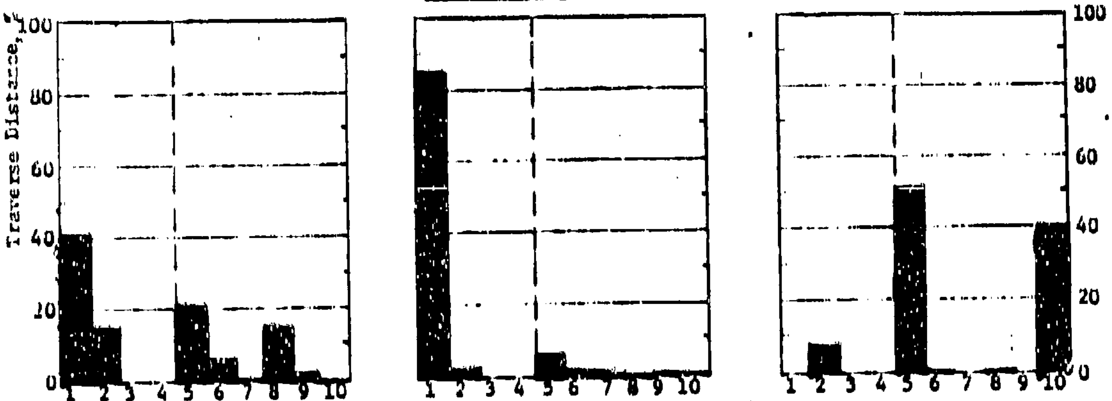


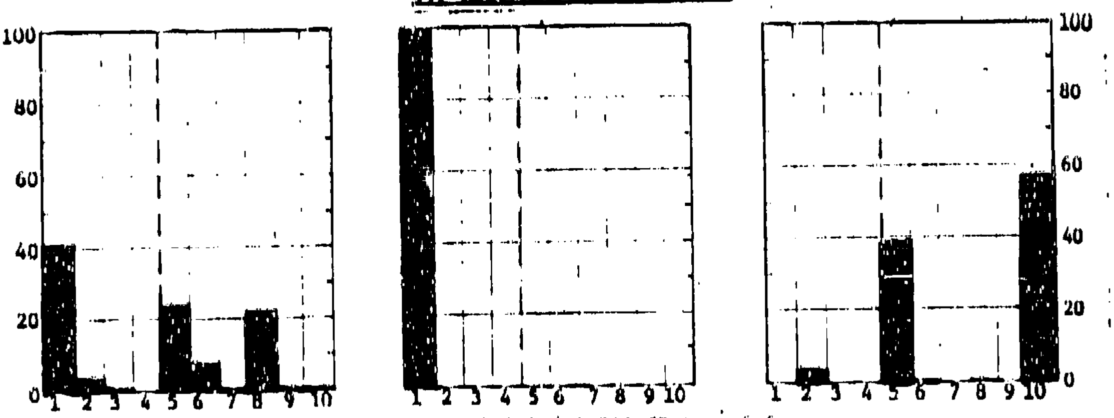
Fig.F1. (sheet 14 of 18)



43. 5-ton, 6x4/M127A1C



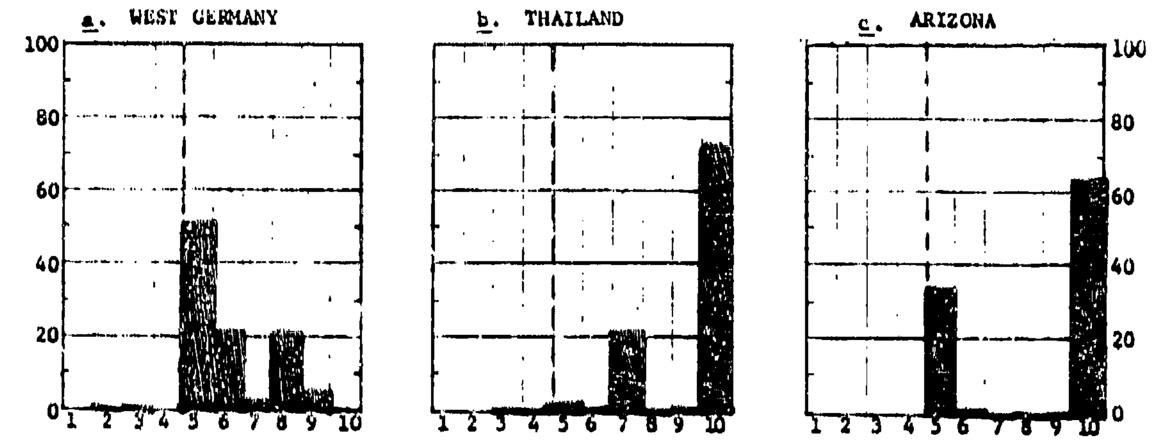
44. M818/M127A1C 5-ton, 6x4



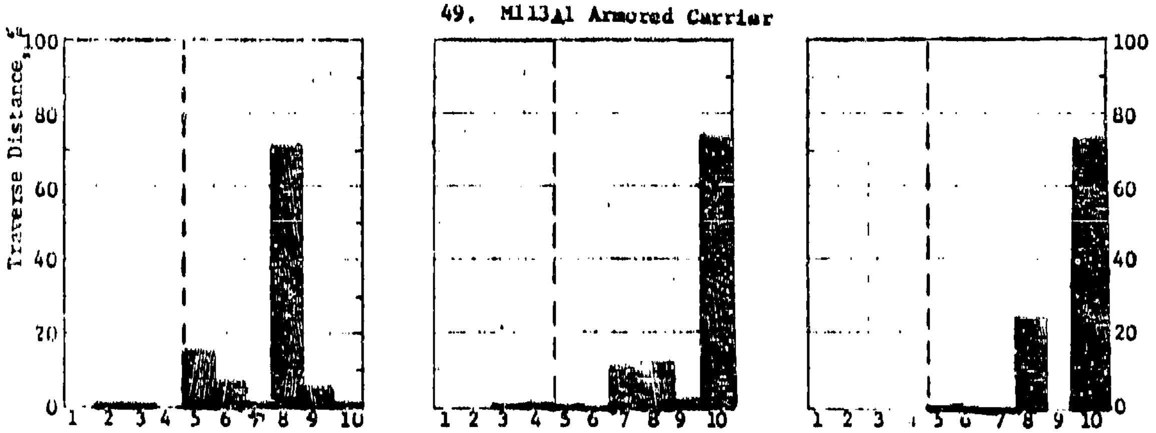
45. M123A1C/M172A1 10-ton, 6x6

Fig.F1. (sheet 15 of 18)

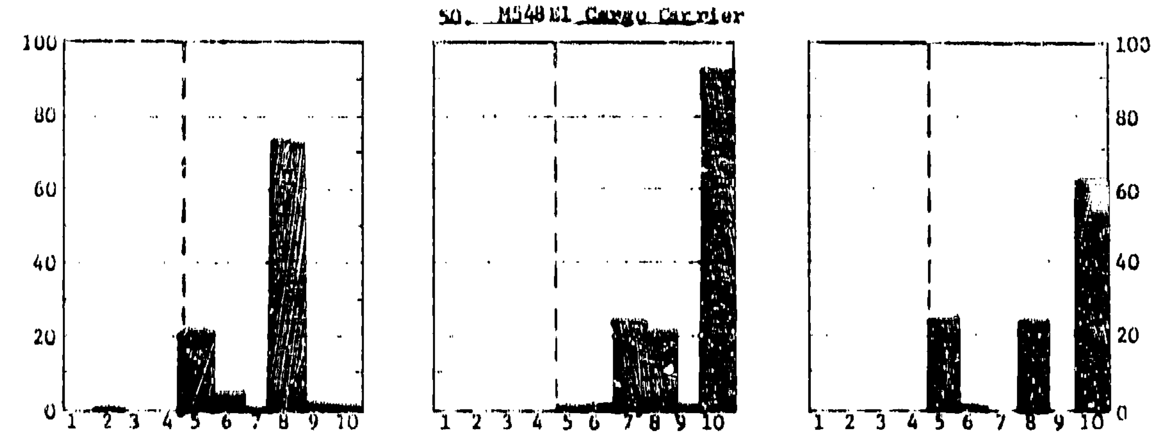
Fig.F1. (sheet 16 of 18)



49. M113A1 Armored Carrier



50. M548E1 Cargo Carrier



51. M60A1 Combat Tank

Fig. F1. (sheet 17 of 18)

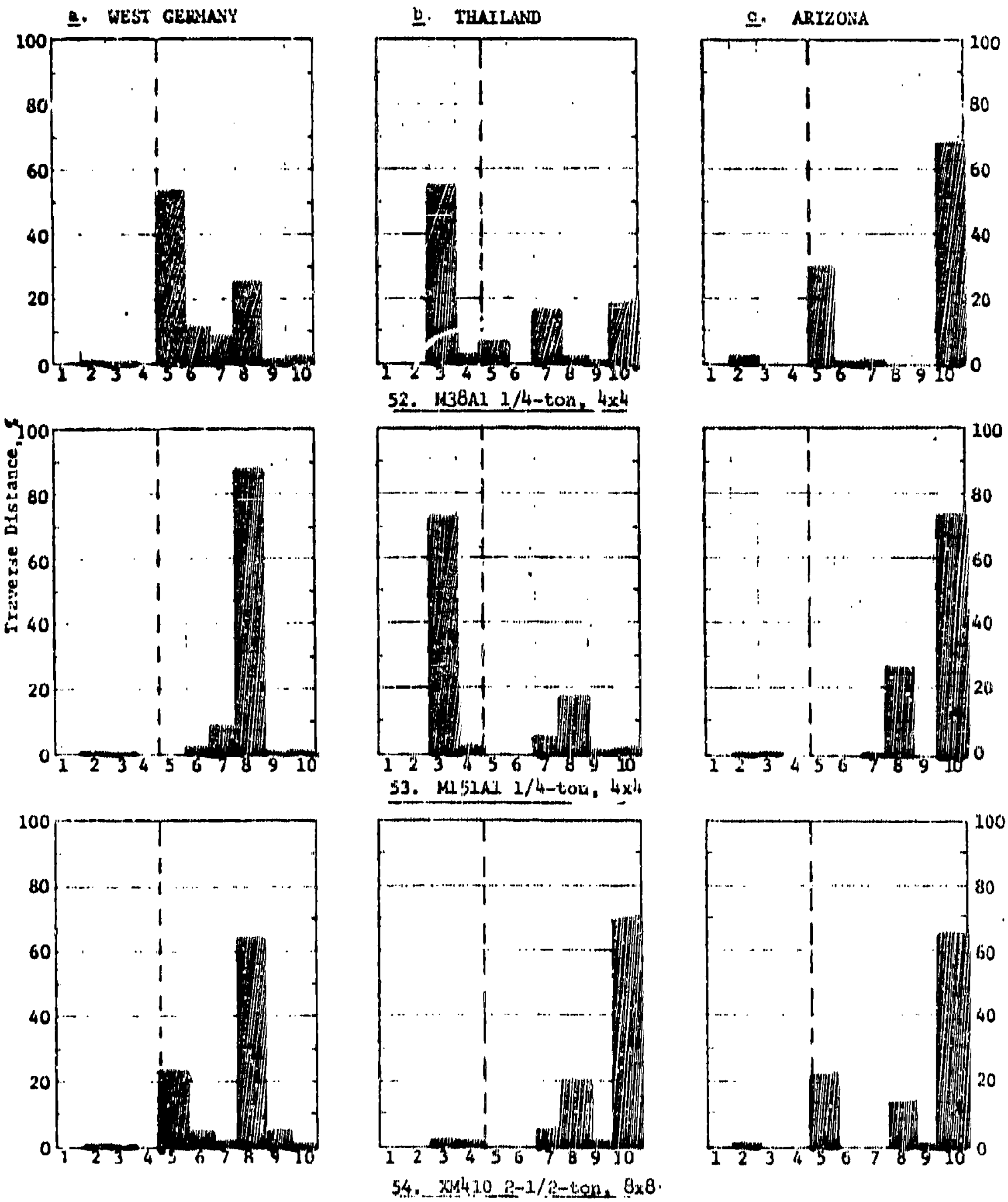


Fig.F1. (sheet 18 of 18)